The Metal Worker

A Weekly Journal of the Tin, Plumbing and House Furnishing Stove Trades

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A Novelty in Filters.—The "Filtre Rapide."

A new filter has recently been brought out in England which deserves the most careful attention from the novel principles involved in its construction, and from the large amount of liquid which may be treated in a given length of time. The engravings show two different forms of the apparatus, which is called by its inventor, P. A. Maignen, of London, the "Filtre Rapide." From the name of the filter, and also from the manner in which the inventor is mentioned, we suppose that he is from France. The filtering material used is charcoal, bone black or paper pulp. The latter material is one which appears not to have been tried upon this side of the Atlantic. The points which the inventor attempted to gain in the construction of this filter were perfect filtration of a large quantity of liquid in a shorts pace of time; ample facilities not only for cleansing, but also for the complete renewal of the filtering surfaces; and, lastly, a uniform and fresh layer of filtering material each time the filter is put in operation.

All these points seem to have been successfully attained by very simple means. The filtering surfaces are vertical and formed of canvas drawn over wooden frames. This alone would not form an efficient filter, but would act simply as a strainer. The charcoal, bone black or paper pulp is therefore mixed with the water to be filtered and allowed to flow through the canvas. This deposits upon the canvas an even filtering coat, filling the pores of the material. Referring to the illustrations, Fig. 1 is a sectional view of one of the smaller filters, and although counted among the smaller sizes, it is said to be capable of filtering at the rate of 40 gallons per hour. This is larger than would be needed for any domestic purpose. The water supply is taken direct from the service pipe, and the flow of water is controlled by a rather peculiar float valve, shown at the top of the water chamber. This valve makes the action of the filter continuous as long as the cock at the bottom is open. A false perforated bottom is put into the water chamber, which, with coarse animal black or bone coal, is used to form a strain and arrest the larger impurities, and also prevent the water from entering the lower chamber too violently. In the oblong chamber below is placed the wooden frame, over which the canvas is stretched to form the filtering surface. This frame is held down upon the bottom of the chamber by a nut and screw which passes through the bottom. Outside of the canvas the chamber is filled with the liquid to be filtered, mixed with the filtering material itself. The first rush of the liquid through the canvas to the exit pipe carries with it the pulped paper, charcoal or other filtering material held in suspension, and deposits it as we have seen, in the pores of the canvas and upon its surface. If the lower portion of the canvas becomes coated first, the current through the upper portion becomes more decided, and of course increases the coating upon the thinly covered portion.

The surface thus obtained is said to be an excellent filtering material, and lasts for a week of continuous filtering, after which the canvas is taken out, and the filtering surface with its impurities removed.

Fig. 2 shows the arrangement employed when it is desired to put up a very large filter in a small space. This filter is intended to contain 16 frames, which are calculated to filter collectively from 400 to 1500 gallons per hour. Upon this basis, it is calculated that it would only require a room 20 feet square by 20 feet high to hold the filters (eight No. 16's) which would be needed to filter 6,000,000 gallons of water in 24 hours. To do this the inventor estimates that 21,250 square feet of filtering surface is necessary. This filter has had a large sale among wine and spirit dealers in England, but it would seem that its value as a water filter ought to give it an equally large sale among water users.

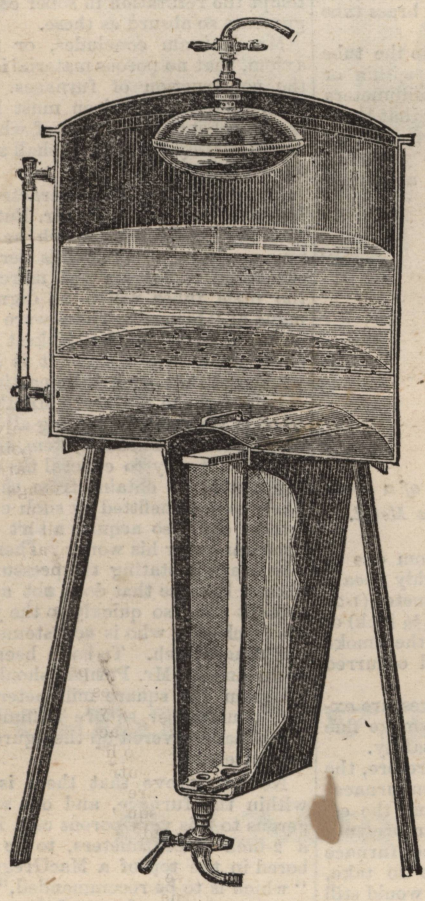


Fig. 1.—Vertical Section of Small Single Filter.

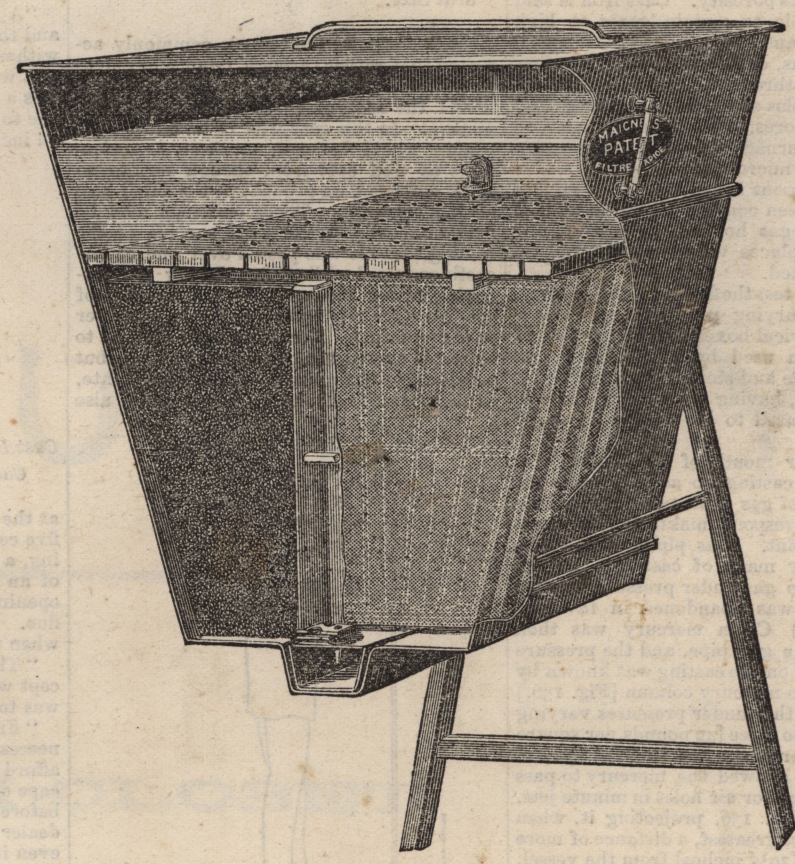


Fig. 2.—Vertical Section, showing Arrangement for Filtration on a Large Scale.

A NOVELTY IN FILTERS.

New Rules of the Patent Office.

It is not generally known by those having business with the Patent Office that a new set of rules have been in operation since January 1st. As these rules are matters of very general interest, we give such as should be known to those who have business with the office:

All business with the office must be transacted by writing, and all letters addressed to the "Commissioner of Patents," Washington, D. C. All matter sent to the office whether by mail or express must be prepaid, otherwise it will not be received. A fee of $15 must be paid on filing an application for a patent on an invention or a discovery, and and an additional $20 on the issue of the patent. A copy of the specifications and drawings of any patent which is in print (including all for several years past) will be mailed to any address in the United States for 25 cents, 20 or more at 10 cents each. No patents granted since March 2, 1861, can be extended except by act of Congress.

A patent may be obtained by any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known nor used by others in this country, and not patented nor described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts and expense, has invented and produced any new and original design for a manufacture, bust, statue, alto-relievo, or bas relief; any new and original design for the printing of woolen, silk, cotton, or other fabrics; any new and original impression, ornament, pattern, print, or picture to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture; or any new, useful, and original shape or configuration of any article of manufacture, the same not having been known nor used by others before his invention or production thereof, nor patented nor described in any printed publication, upon payment of the fees required by law and other due proceedings had.

If it appear that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof if it had not been before patented or described in any printed publication.

The specification is a written description of the invention or discovery, and of the manner and process of making, constructing, compounding and using the same, and is required to be in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertain, or with which it is most nearly connected, to make, construct, compound and use the same. It must conclude with a specific and distinct claim and claims of the part, improvement or combination which the applicant regards as his invention or discovery.

The following order of arrangement should be observed when convenient in framing the specification, such portions as refer to drawings being omitted when the invention does not admit of representation by drawings:

1. Preamble giving the name and residence of the applicant, the title of the invenvention, and the statement required by the last clause of Rule 39;
2. General statement of the object and nature of the invention;
3. Brief description of the drawing, showing what each view represents;
4. Detailed description, explaining fully the alleged invention, and the manner of constructing, practicing, operating and using it;
5. Claim or claims;
6. Signature of inventor;
7. Signatures of two witnesses.

The applicant, if the inventor, must make

oath or affirmation that he does verily believe himself to be the original and first inventor or discoverer of the art, machine, manufacture, composition, or improvement for which he solicits a patent, and that he does not know and does not believe that the same was ever before known or used; and shall state of what country he is a citizen, and where he resides.

Iron as a Material for Furnaces.

We t[ake] the following article from an apparently interminable series upon various subjects, which have appeared at irregular intervals for the past year or two in the *American Architect and Building News*, under the head of "The Open Fire Place." What connection the author, presumably Mr. J. Pickering Putnam, found between the title and the subject treated of in this article we do not know. However, in a recent issue he talks of cast iron as a material for making furnaces. Evidently there is an object in view, and from the drift of the remarks it seems to be a wrong one. The abundant faults of a cast-iron furnace no one will deny, but when an author takes pains to point out with such minuteness of experiment faults such as are mentioned in this paper, the whole thing is open to the imputation of insincerity or something worse.

Below we give the paper entire, taking care, however, to insert the equivalents of the French weights and measures in pounds and feet and inches. These additions we have placed in brackets, to destinguish them from the author's work.

"It is evident that a porous material is unsuitable for the construction of furnaces, because the noxious gases generated by the burning fuel, especially by anthracite coal, pass through it under a back pressure, or even in cases of a sluggish draft. With an ordinary drum furnace like the Magee or MacGreggor there is almost always an outward pressure from within at the top of the drum even when the draft is good. Under a given pressure the amount of gas passed through a given material will be in direct proportion to its porosity. Cast iron is said to be permeable to certain gases at high temperatures, and according to L. Cailletet*, to hydrogen gas, even when cold. Whether the gases pass through the pores, or through invisible air holes so minute that they may be classed as pores, is immaterial so far as concerns the furnace maker. It is sufficient to know that microscopic air-holes are so liable to be present in the castings that the material has been condemned as unsafe and unsuitable for gas holders, compressed air tubes, and all places where a gas pressure has to be resisted.

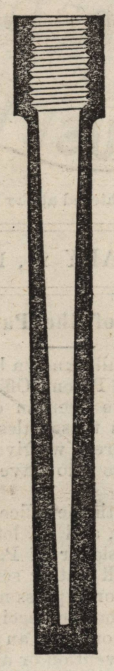
"In order to test the degree of this permeability under varying pressures, the writer had six cylindrical boxes cast from some of the softer iron used by a foundryman in making furnace and stove castings.

"The boxes, having the section shown in Fig. 135, appeared to be perfect in every particular.

"The top or mouth of each piece was threaded after casting, so as to receive the end of a piece of gas pipe two meters long threaded to correspond, making with cement an air-tight joint. (Gas piping was formerly frequently made of cast iron, but its permeability to gas under pressure was too great, and it was abandoned in favor of wrought iron.) Clean mercury was then poured into the gas pipe, and the pressure in atmospheres on the casting was known by the hight of the mercury column [Fig. 136.] It was found that under pressures varying from one [14] to three [42 pounds per square inch] atmospheres, the first three of the six castings tested allowed the mercury to pass through the pores or air holes in minute jets, as shown in Fig. 136, projecting it, when the pressure was greatest, a distance of more than a meter [39⅓ inches] from the vessel. Yet the feeblest pressure was sufficient to cause it to escape from the largest openings. The other three castings resisted the test. A greater pressure than three [42 pounds] atmospheres could not be applied with the materials at command. The mercury became much dirtied, after the first three experiments, by impurities in the gas pipe and castings, so that it is possible that the amalgam thereby formed filled the pores in the last three castings and itself prevented the passage of the pure mercury.

"This experiment was suggested by the experience of Professor Wolcott Gibbs, of Harvard University, from whom I have the following: He was filling a cast-iron pot with mercury, and had poured into it about 50 kilograms of the metal when it was observed suddenly to shoot out in fine streams in all directions through the pores of the vessel. Professor Gibbs described the iron which he used to be perfect so far as the eye could detect. The boxes in which mercury is put up for the market have to be made of wrought iron.

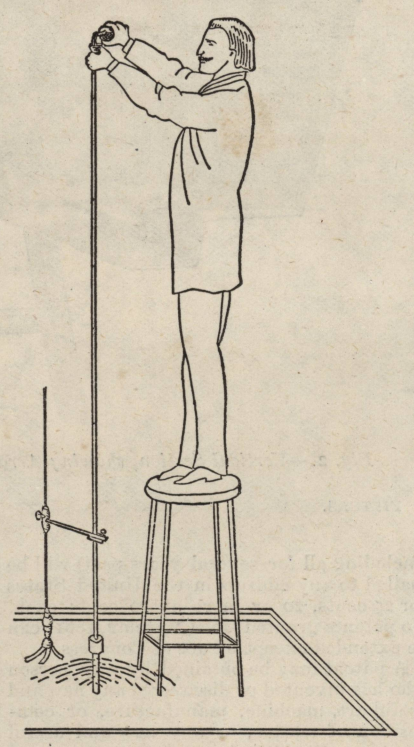
"The six castings tested, as above described, were 15 centimeters [5⅞ inches] long each, and nearly two centimeters in diameter [three-quarters of an inch]. The metal was two millimeters [scant 3-32 of an inch] thick at the threaded end under the shoulder, and about five millimeters [3-16 of an inch thick] at the other end. The object of this gradation of thickness was to discover what effect the thickness of the coating had upon its permeability. It happened that the mercury escaped in all cases at points near the middle of the cylinders, where the metal was of medium thickness. But inasmuch as it did not flow from all parts of the castings with equal freedom, but rather from particular localities in each, it would appear that it could hardly have passed



"*Fig.* 135."

Cast Iron for Furnaces.—Section of Casting of rather more than Half the Natural Size.

through pores, as the term is commonly accepted, but rather through minute accidental pin-holes between the granules or crystals of the materials not to be avoided in casting. In this case iron of a hard, close texture would be open to these imperfections as well soft iron, though not to so great a degree, on account of the small size of the crystals. These openings may be partially closed by filling the surface of the casting. A file was passed over one of the castings tested while the mercury was escaping under the pressure. A number of the jets were obliterated, only the stronger ones remaining. For this reason samples to be tested should not be turned or filed, but subjected to the pressure in the rough state, as they come from the foundry. It is also



"*Fig.* 136."

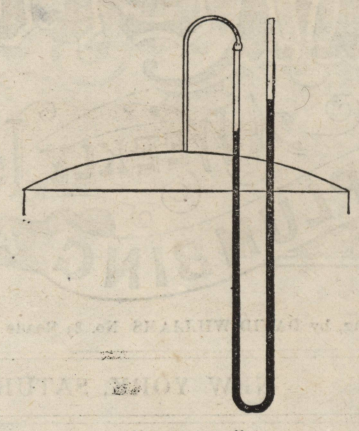
Cast Iron for Furnaces.—Forcing Mercury through a small Casting.

in this state that they appear in furnaces for the sake of which the tests are made.

"Hammering is still more effective than filing, and in wrought iron the pores and air holes are completely closed.

"Thus every part, as large as the small samples tested, of every casting used in a furnace is liable to come out riddled, like them, with minute holes invisible to the eye, yet large enough to allow of the escape of gas under pressure. This outward pressure exists more or less frequently in every hot-air furnace now known. In the ordinary dome furnace, it is constant in ordinary use, as previously said. Furnacemen will differ in regard to this and will say that it is impossible, thinking that a powerful upward chimney draught would overcome any slight upward tendency given by the hight of the dome above the lower opening into the smoke flue.

"Others will be as positive the other way.



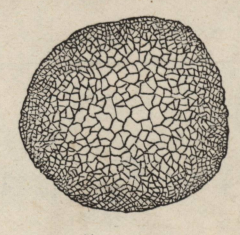
"*Fig.* 137."

Cast Iron for Furnaces.—Showing Method of Demonstrating Slight Pressure within Furnace.

But the practical furnace man is unfortunately not the authority to consult on these matters. He is commonly ignorant of the scientific principles which should govern the construction or regulate the use of a furnace, and generally unwilling to see the virtue of any arrangement not found in his own.

"To ascertain the trutb, the writer was obliged to have a hole bored in the top of the dome of his own furnace, which is a wrought-iron MacGreggor furnace No. 4, one which is to be recommended. It is similar to the Magee, shown in Fig. 132. The opening was five centimeters (2 inches) in diameter and threaded to take a brass tube as shown in Fig. 137.

"A manometer was attached to the tube and the pressure of the gas from within or without accurately measured in millimeters of a water column. It was found that there was a constant outward pressure of from one to eight millimeters (4-100 to 31-100 of an inch or from 3-32 to 5-16ths), according



"*Fig.* 138."

Cast Iron for Furnaces.—Section of a Small Casting, showing Grain of the Metal.

as the check-draught door was from one to five centimeters open. Or, roughly speaking, a pressure of about one millimeter (1-25 of an inch) for every centimeter (⅜ inch) of opening. No valve was used in the smoke flue. The same pressure outward occurred when the feed door was open.

"There was never an inward pressure except when the draught up the smoke flue was too powerful to be left with safety.

"From these experiments, therefore, the necessary inference is that cast-iron furnaces afford no adequate security against the escape of gas. Even if tested under pressure before use, a precaution which no furnace dealer or maker would venture to take, even if it were practicable*, they would still be unsafe for the following reason: A casting of iron when examined in section, Fig. 138, will be found to be densest at the surface and more and more open or larger in grain approaching the center. In a section of soft Scotch pig iron the granules at the center appear as large as those in the center of our figure, while the outer portions are very much finer. Outside of all a coating of silicate forms a thin skin comparatively impervious, so that a furnace, which when new would resist every test, might prove to be quite useless as soon as the thin outer coatings were destoyed by heat and rust.

"With wrought iron these objections do not hold. The gas pipe used in the experiment illustrated in Fig. 136 was of wrought iron. As was to be expected, no mercury passed through it under the greatest pressure then applied.

"Wrought iron is, however, more quickly burnt out than cast iron. But the difference is not important, especially where fire clay linings are used and proper care is taken in its management.

"What will happen to iron in a red hot condition seems to me to be entirely of minor importance. The matter is almost wholly dependent upon the quality of the castings used.

"To obtain castings which, in the cold state, will allow no gas to pass through under greater or less pressure, either when new or after a little use, I believe to be difficult if not impossible, as furnaces are now made, and at best always a matter of chance.

"Most basement furnaces are now so constructed that it is never necessary to raise them to a red heat to obtain the best results, and, in practice, this high temperature is seldom seen except under careless management.

"The experiments of Deville and Troost (who were bound, as scientific and conscientious investigators, to select with care perfect castings for their test) show that a very small quantity, about one-half a cubic centimeter, of carbonic oxide was found at the surface of the iron when heated to redness for every million cubic centimeters of air passed over the stove. Of this small quantity, part was generated by the fuel within and permeated the iron, and part was formed on the surface by the decomposition of the constituents of the air coming in contact with it. These experiments, and the report of General Morin to the French Academy, have given rise, for the last ten years, to endless heated discussions as to the danger of iron in this condition—discussions as fiery when prompted by pecuniary interests as the iron itself under consideration, and having as little to do with the practical question as red-hot iron has to do with properly made modern hot-air furnaces in general. Since these famous experiments the iron has cooled off to a moderate temperature, but the discussions glow as fiercely as ever.

"The fire-pot, now much thicker than the iron of the stove tested by Deville and Troost, is, in a proper furnace, also protected by fire-clay (practically to prevent the iron from burning out, but nominally to allay the fears of the worried and excited public). The radiating surfaces remain as thin as before, but are no longer heated to redness."

It is almost an absurdity in itself to attempt the refutation in sober earnest of arguments so absurd as these.

Mr. Putnam concludes, or takes as an axiom, that no porous material is suitable for the construction of furnaces. If that be true, then wrought iron must be excluded from the list of substances of which furnaces may be safely built, as we shall show further on.

To prove the porous character of the cast iron used for furnaces, Mr. Putnam undertook the experiments which he details, and by a pressure of 42 pounds per square inch succeeded in forcing the mercury through the little tubes which he dignifies by the name of "boxes." These were only 3-16ths of an inch thick at the thickest point, and a scant 32d at the neck. It is hardly to be wondered that such little castings were decidedly light in texture. Mr. Putnam, however, is very wise in putting all his measurements into the French system, as he is thereby able not only to conceal the absurdity of the results he obtains from those who are likely to be benefitted by such experiments, but he can also acquire a sort of scientific appearance for his work. There is also an advantage in stating the pressure in atmospheres, because that does not appeal at the present time so quickly to the judgment of the mechanic, who is accustomed to pounds per square inch. To have been consistent with himself, Mr. Putnam should have used kilogram for square millimeter, or, better yet, pounds per square millimeter, which would have covered up the figures still more completely.

Now, to prove that there is a pressure within the furnace, and one which is dangerous to this very porous cast iron, he has a 2-inch (5 centimeters, to be exact) hole bored in the top of a MacGreggor furnace, "which is to be recommended," and applies a gauge in the shape of the water column commonly employed to register very small pressures. Had the gentleman put the results of this experiment in feet and inches, and then reduced the water pressure to pounds or ounces per square inch, he would have shown the utter foolishness of his remarks. The highest pressure which he obtained was equal to about 15-16ths of an inch of water column, equal to about 0.11 pounds per square inch. The argument is equivalent to saying that, because water can be forced through wrought iron under hydraulic pressure, it is, therefore, an unfit material for a tank that is to hold gas under a merely nominal pressure.

It will be observed that he only wished to prove that there was an outward pressure. He did not attempt to show that any of the gas really passed through the metal; this he leaves to the two French chemists whose experiments have so often been used as arguments against cast-iron furnaces. From them we have the astounding figures that gases do pass through thin cast iron kept red hot at the rate of one part in two millions. Carbonic acid is commonly found in greater quantities than this in the external air, and is considered harmless. Even the wildest dreams of the opponents of water gas would hardly dare to say that a mixture of one part of carbonic oxide with 2,000,000 parts of air would be injurious.

The folly of all this is best seen when we

* "L. Cailletet überzeugte sich dass das Eisen, nicht nur wie Deville und Troost nachgewiesen, im stark erhitzten Zustande, sondern auch bei gewöhnlichen Temperatur von Wasserstoffgas durchdrungen werde." (Wagner's Jahresbericht, vol. xiv., p. 54.)

[1] The only test made by furnacemen is a "careful" ocular inspection. This is evidently equivalent to no test at all, the air holes being microscopic; a test would involve either setting up the furnace complete and applying atmospheric pressure or else a special test of each particular casting, both of which are too difficult to be applied in practice.

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come to examine an ordinary furnace, and find that it often has numerous joints so loose that a puff of smoke will pass through them without a pressure of even one millimeter of water column behind it. Some cast-iron furnaces even are so poorly riveted that they would not hold water, the joints not being calked. What folly then to be talking of the permeability of the metal of which a furnace is made when every joint in the whole structure would pass more gas per linear inch in equal time than the whole surface of the metal could.

Furnaces have a variety of faults, and those of cast iron as many as any other, but it seems evident the Mr. J. Pickering Putnam, architect, has been seeking something besides their weakest points.

The Telephone.

From J. S. C., *Hope, New Jersey.*—Can you send me the address of parties of whom I can obtain information about the telephone? How does it work, and what does it cost?

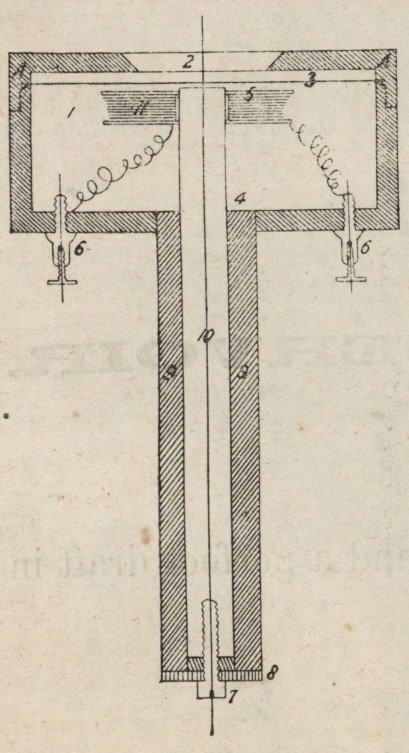
Answer.—The Bell Telephone Company, Limited, 518 Broadway, New York city, are the manufacturers and owners of the important telephone patents now in use in this country. Mr. Edison's chalk transmitter is probably by far the most powerful instrument of the kind manufactured. This, we believe, is also made or sold by the Bell Telephone Company. The principle upon which a telephone acts is not so difficult of explanation as might be at first supposed. In our issue of August 17, 1878, we published directions for making a cheap telephone. As these may be of interest and value to others of our correspondents besides J. S. C., we reproduce both the cuts and the descriptions complete. The drawings are all exactly half size, and show precisely how the individual parts are constructed and how they are put together. No lathes or special tools are required; a pair of scissors, a pocket knife, a pair of drawing compasses, or any means of drawing circles, a gouge, a gimlet and a glue pot are all that are needed.

The numbers in the margin correspond to the numbers in the diagram:

1. *Box.*—A circular wooden box, such as can be obtained from any druggist. Those used for tooth powder or pills answer best.

2. *Conical Hole.*—Cut in top of box to speak into and listen at.

3. *Iron Plate.*—The iron ferrotype plates, such as are used in photography, are the proper material. A stout pair of scissors will cut it. The plates can be obtained from the electric apparatus manufacturers, all ready cut into circular form, at a cost of about 5 cents each.



The Telephone.—Diagram 1.

4. *Hole in Bottom of Box.*—This is cut just large enough to fit the large cardboard tube into.

5. *Reel.*—Make a cardboard tube of length given in Diagram 2, to fit tight round the magnet. Cut two disks of cardboard, make holes in center to fit small tube, and glue them on as shown in Diagram 2. Wind the wire on to the tube in layers; any direction will do.

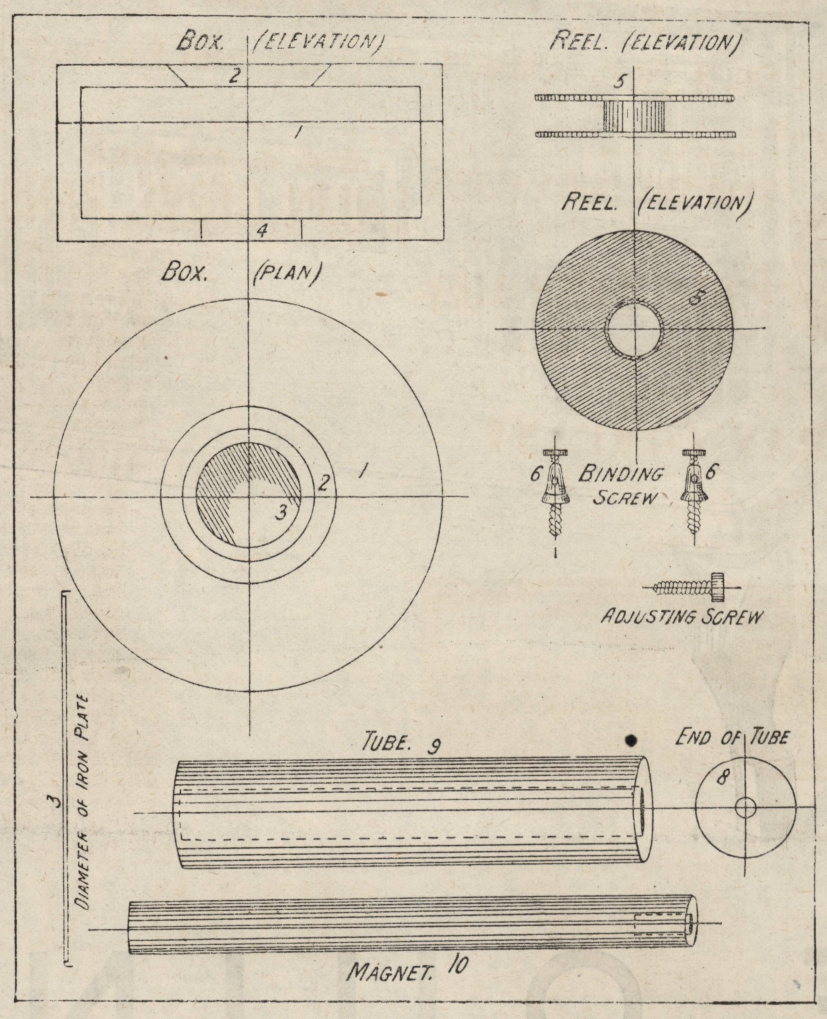
6. *Binding Screws.*—They are used to connect the two telephones by means of wires placed in them. The ends of the wire on the reel are joined to the screws, as shown in the sectional drawing (Diagram 1). These screws cost about 10 cents each.

7. *Adjusting Screw.*—For regulating distance of magnet from iron plate. It is an ordinary machine screw.

8. *Wood for End of Large Tube.*—Is glued on, as shown in sectional drawing (Diagram 1). Cut it out with a knife.

9. *Large Tube.*—This makes a handle to the telephone and a cover to the magnet. It is made by rolling a strip of cartridge or stout drawing paper round the magnet, and gluing it as you go on. It must fit the magnet, but not tightly. The magnet must be free to move up and down. When the tube is made it is glued tightly into the hole in the bottom of the box, as shown in Diagram 1.

10. *Magnet.*—The reel is put on one end, and the magnet placed as shown in the



The Telephone.—Diagram 2.

drawing (Diagram 1). The magnets cost 20 cents each.

11. *Wire.*—This may be of any size from No. 28 to No. 40. It is silk-covered. No. 40 is recommended as best by some, and an ounce of it will cost about 95 cents. No. 28, silk-covered, would cost about 14 cents. On short lines some English authors think the No. 28 preferable to any other size.

In regard to the reels we may say that they can be obtained already wound with wire for 75 cents each.

The covering material may be cotton velvet, although any cloth will answer.

The best position for the magnet as regards the iron plate, must be found by using the adjusting screw, but about 1-16th of an inch is nearly right. If there should be no ledge in the lid of the box against which to fit the iron plate, as shown in the sectional drawing (Diagram 1) at A A, cut rings of cartridge paper 1-16th of an inch in breadth and fit them in until the plate no longer touches the top of the box. Then, by shutting the top tightly down, the plate is kept in its proper position.

Telephones made in this way have worked well over 400 yards of wire.

The sectional drawing (Diagram 1) gives the appearance of the telephone if cut straight down the middle, and therefore shows the proper position of the parts.

The drawing of the separate parts (Diagram 2) is sufficiently plain and needs no explanation.

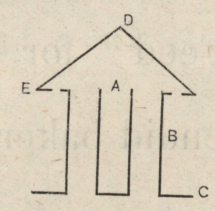
When the pair of telephones have been constructed as described above, they must be connected with wires attached to the binding screws. For ordinary distances No. 22 cotton-covered wire will do, but the wires must be covered with gutta percha or "kerite," to be kept in the open air, or where there is a risk of their getting wet. Wire of this kind costs, at present prices, from 2½ to 5 cents per foot. A very fair sort of wire for this purpose can be obtained for 1½ cents per foot. No. 21 wire covered with cotton costs 90 cents per pound, and a pound measures some 450 feet.

Probably any firm dealing in telegraph supplies could furnish the principal parts mentioned. Messrs. Pearce & James, of 149 William street, New York, supply wire, binding screws, magnets and probably almost any of the materials neccessary for work of this kind. A pair of complete telephones may be obtained of many of the smaller manufacturers of telegraph supplies for about $4. At least that was the price asked a year or two ago. Although there are patents upon the telephone, there is no law by which a man may be prevented from making a patented article for experimental purposes only.

Ventilators for Show Windows.

From W. H. S., *Philadelphia, Pa.*—I would like to know whether a ventilator, similar to that shown in the annexed sketch, would be sufficient to ventilate a bulk window so as to prevent the glass from getting obscured by moisture, as it generally does in cold weather. This moisture is a great nuisance, as it prevents the goods contained in the window from being seen. The ventilator is to be placed in the top of the bulk, the lower part coming flush with the inside of the board at the top of the window. The sketch shows a ventilator composed of two cylinders, one within the other, A, which is about 4 inches in diameter, being the one inside and B the outer one; the latter is 6 inches in diameter. These are brought flush on the bottom, as shown at C, which is the inside of the window. The flaring cover, D, is set so that the edge E comes just below the tops of the cylinders, say half an inch. Will it be an improvement if the outside cylinder is cut off at the top and the inside one run up higher, the flaring cover still keeping the place shown in the sketch? Would it improve it to bring the conical top down and punch a line of holes around the upper part of B, where they would be protected by the top from wind, rain and snow? My idea is that the hot air will pass up through A, and the cold air down through B. Have you any better plan than this to suggest?

Would the arrangement proposed ventilate the room of a top story if the cylinders were run through the roof and their bottoms made flush with the ceiling?



Ventilator for Show Windows.

Answer.—The object of ventilation of "bulk" or show windows is to prevent the accumulation of moisture upon the glass. The causes, perhaps, may be put under two heads, for convenience sake. The first of these is a saturation of the air inside the window with vapor from the lights. This is liable to take place at almost any time of year. All the liquid hydrocarbons like petroleum, as well as those in illuminating gas, when burned, form water which passes off in the form of vapor, rising with the hot products of combustion. If in a show window there is no outlet for the vapor while lights are burning, it soon saturates the air and is deposited upon the glass, the goods, and all the solids within reach.

What we may call the second cause produces dampness upon the windows without regard to the lights, and is just as annoying in the daytime as at night. This trouble is generally met in cold or damp weather, and is caused by the cold glass condensing the vapor in the air upon its surface. Although more annoying in the winter than at any other time, it is liable to happen at any season when the air outside is much colder than that inside the window. In the first case ventilation is a sure and complete cure. Allow an abundance of fresh air to enter at the bottom of the window, and allow the hot air from the upper portion to escape, and there will be no more trouble. If plenty of air enters below, the temperature inside of the windows will be nearly the same as that of the external air, and there will be no deposit of dew upon the glass. The gases from the lights are often taken off in special chimneys. In very cold winters, or in places where the thermometer goes down nearly to zero, even the ventilation does not seem to be altogether sufficient, and we find the external cold so great as to cause the glass to condense the moisture of the inside air upon it, and commonly to freeze at the same time. We have seen windows which were completely cut off from the store, and were so perfectly ventilated that frost did not appear on them even in the coldest weather.

To ventilate a window, we must follow the same practice as in ventilating a room, and make a place for the warm air to escape and another for the cold air to enter. To make the circulation active, we must make the warm-air opening as high, and the cold-air opening as low, as possible. Our correspondent's plan—to make the cold air enter at the top of the window, while the hot air is escaping from nearly the same point—is not likely to work. A single pipe, with a good hood over it, is what is needed at the top. Then there must be an opening for the admission of fresh, cool air at the bottom of the window. This should be protected in some way, or so located that rain and wind will be excluded. If the ventilator was used as W. H. S. suggests to ventilate a room in an upper story, the warm air would, no doubt, pass out through it, but the supply of cold air to take its place would, in all probability, enter around doors and windows, and not through the apparatus itself.

The modifications which are proposed would not help the ventilator to do the double work of admitting cool air and passing off that which has become heated.

Gongs.

Some little time since a subscriber asked several questions in regard to gongs, and among them was one regarding their manufacture. At that time we could give very little information beyond the fact that they were not made in any except Eastern countries. Since then we have learned that many years ago one M. de Arcet, probably a Frenchman, discovered that bell metals formed of 78 parts of copper united to 22 parts of tin, were nearly as brittle as glass when cast in the form of gongs or thin plates. He succeeded, however, in making gongs from such castings by heating them to a bright cherry red and plunging them in cold water. To prevent them from bending they were held between plates of iron. The metal, after this treatment, was found to become malleable. From the tone of the description we judge that this was done on something more than an experimental scale.

Plain or Galvanized Iron Pipe for Drive Well.—Alloy of Zinc and Lead.

From C. G. P., *Cleveland, Ohio.*—Can you tell me which is the best for a drive well, plain or galvanized iron pipe?

Can you also tell me how to make an alloy of equal parts of zinc and lead?

Answer.—Galvanized iron pipe is not fit for wells. It is not fit for use in any place where people are likely to drink the water which comes through it. Plain iron may be rusty, and the water that first comes through it on starting the pump may be colored by it; but it is not injurious to health, and by reason of its color, is not likely to be used. Zinc and galvanized iron, as has been repeatedly stated in the columns of *The Metal Worker*, should not be allowed to touch anything that human beings are likely to use for food or drink. A great many of the bowel and stomach troubles which people complain of in the summer season and believe are caused by drinking water, really come from taking water which has been standing in zinc or galvanized vessels. We do not wish to be understood as saying that all the stomach and bowel troubles come from this one source, but it is true that a great many people are injured by drinking water which has more or less zinc in it.

We judge from the character of our correspondent's question that he has already found out that zinc and lead do not mix under ordinary circumstances. The amount of zinc which lead will take up is only about 20 or 24 ounces per hundred pounds. By adding arsenic or antimony the quantity may be somewhat increased; but to make them combine in equal parts cannot be done in the present state of the arts, without adding other metal in quantity more than that of both zinc and lead combined.

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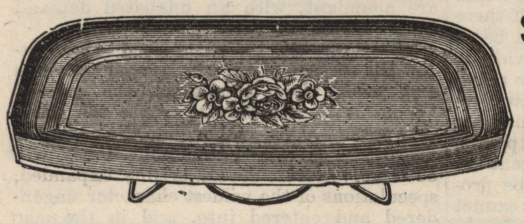

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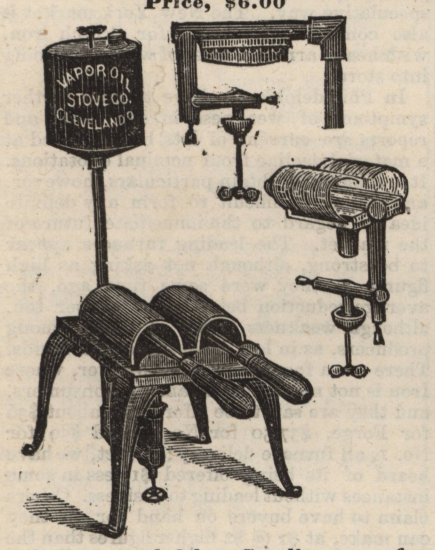

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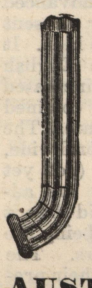

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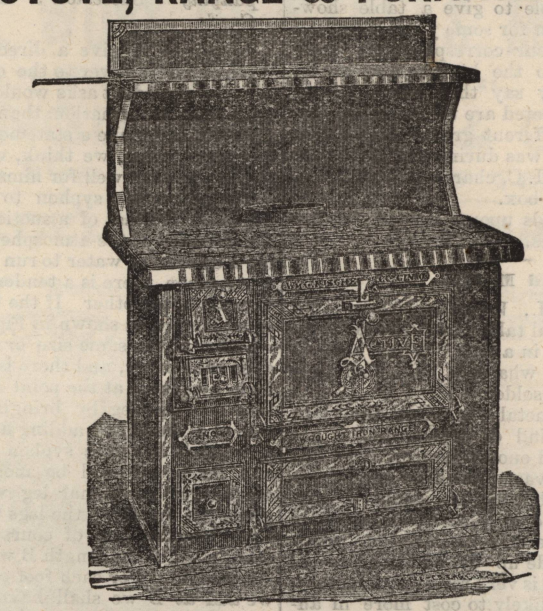

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Average Price of Tin Plates.—Highest and Lowest Prices.—Australian Supply of Tin Plates.

From E. B. S., *Buffalo, N. Y.*—I notice with pleasure, in the issue of January 3, your remarks upon the tin plate market, showing the remarkable course which it has taken during the past 12 months.

Do I understand by the "average price" of ordinary tin plates that I. C. charcoal is meant in the table? and that on October 3, 1878, I. C. charcoal was $5.18? Will you also give, in *The Metal Worker*, the highest and lowest price that I. C. charcoal tin has touched since 1840?

Are tin plates manufactured on the continent of Australia, or do they look to England for their supply?

Answer.—In the table mentioned by our correspondent, I. C. charcoal plates are not the plates referred to. On the 2d of October, 1878, the price of I. C. charcoal in the New York market was from $6 to $6.25 per box, the latter being the list price and $6 the price to close buyers. On October 3, 1878, coke wasters were sold at $4.62½ to close buyers and $4.75 was the list price, while perfect coke plates the same day were sold at 50 cents more, or $5.25 per box. These were low grades of coke plates. High grades of coke plates sold, on the same day, at $5.50. The lowest list price for I. C. charcoal in October of that year was $6.25. Roofing tin was $5.75. The quotation given was probably on coke tins. We shall, at an early date, be able to give a table showing the price of tin for some years past, and this will answer our correspondent's question in regard to the highest and lowest prices. We may say that these figures which we have quoted are the lowest in this market for the different grades mentioned. The highest price was during the early part of the war, when I. C. charcoals were something like $30 per box.

Australia depends upon England for her supply of tin plates.

Old Metal.

From H. W. H., *Versailles, Ohio.*—We have a lot of metal taken from the joints of copper pipes used in a still. What kind of metal is it? Also what can be added to it to make tinmen's solder.

Answer.—The metal was, most likely, in the first place a kind of solder, but it has probably dissolved enough copper from the pipes to which it was applied to transform it into a sort of brass. We doubt if anything can be added to it to make a solder which would give any satisfaction whatever. Solder made up by additions to old metal of this kind is very rarely satisfactory, and in the end is likely to cost more in annoyance and labor than a first-class article bought outright.

Stopping Holes in Castings.

One of our exchanges gives the following directions for stopping holes in castings or covering scars: "A preparation is made of gum arabic, plaster of Paris and iron filings, and if a little finely-pulverized white glass be added to the mixture it will make it still harder. This mixture forms a very hard cement that will resist the action of fire and water. It should be kept in its dry state, and mixed with a little water when wanted for use." This should be fire-proof after it it has had time to harden, and to judge from the nature of the plaster of Paris, we should expect that after a time it would be waterproof. Where in contact with iron the plaster rapidly oxidizes the metal, and in a short time becomes impregnated with it. Plaster of Paris expands when "setting," and this property is made use of when it is employed to stop cracks, the slight expansion completely filling the whole opening.

Joint for a Corrosive Liquid.—Diluted Sulphuric and Nitric Acids.

From S. A. H., *Philadelphia, Pa.*—Not long since I put in some 35 feet of *terra cotta* pipe in an institution where they use large quantities of nitric and sulphuric acid. The pipe is run along the wall at an incline of 45 degrees or more. This pipe has to carry off large quantities of a warm and weak solution of nitric and sulphuric acid. This weak acid works its way through the joints and runs over the cellar floor, damaging everything it comes in contact with. I have used fire clay and the best cement I can get. I have tried cement and sand, and cement and iron filings, but none of them will stand. Whenever the solution strikes them they crumble all up and the liquid comes through the joint. I have the pipe tight now, with a joint made with rags, calked with putty and iron filings. It seems to stand for the time being, but I have to watch it all the time, for I know that as soon as the acid eats through the rags it will soften the putty and the joint will leak. Can you tell me how to make the joint tight?

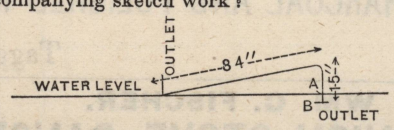
Answer.—The combination of acids with which our friend has to deal is about as corrosive as any that could be mentioned, and we do not wonder that he has found difficulty in keeping it from destroying the joints. We think, however, that the trouble may be overcome and tight joints made by the use of pitch, asphaltum or common roofing tar. If this is run into the joints, with, perhaps, a small tow gasket at the bottom to prevent its flowing into the pipe, the joint will be made tight and will resist the action of the acid. A lining of bricks, laid in the ordinary pitch used for roofing, has enabled people to use a wooden tank for boiling sulphuric acid, and the same material will answer to make the joints for a pipe which is to take the acid away. Will our correspondent try the pitch and let us hear the result?

Gasoline for Heating Coppers.

From J. F. S., *Summit City, Pa.*—I notice an inquiry in a recent number concerning fuel for a tin shop. I have been using gasoline for a year with satisfactory results, save only that I think there is more trouble in keeping irons in good order when heated in a gasoline flame than in a charcoal flame. From experience, it seems to me that the tinning does not last as long in the gasoline flame as in a charcoal furnace. Have others of your readers noticed this fact?

A Long Syphon.

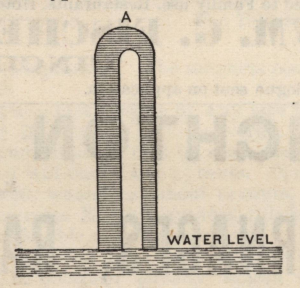
From A SUBSCRIBER.—Will a syphon constructed upon the plan shown in the accompanying sketch work?



A Long Syphon.—Fig. 1.—*Sketch Accompanying "Subscriber's" Letter, showing Grade.*

Answer.—To give a direct and positive "yes or no" answer to the question which our correspondent asks would require some what more information than he has given us. We can make a statement of the case, however, which, we think, will enable him to answer very well for himself.

The power of a syphon to deliver water depends, like that of a suction pump, upon the pressure of the atmosphere. By allowing a column of water to run down one leg of a syphon, there is a tendency to create a vacuum in the other If the two legs are of equal length, as shown in Fig. 2, no matter whether of the same size or not, they balance each other, and there is a tendency to form a vacuum at the point A. If now we lengthen one leg by bringing it over the side of a vessel and adding a piece B in Fig. 3, we shall have the syphon able to work, and its power will be measured by the amount of additional leg which we have given it. In Fig. 3 the legs C and A are of equal lengths, and of course balance each other; hence the length B will have all the work to do. For each foot of length which we add at B we shall have a pressure of seven ounces per square inch to force the water through the syphon. That is, if we make the discharging leg 1 foot longer than the leg which dips into the water we shall have a pressure of 7 oz. per square inch to force the water through the pipe; if it is 2 feet the pressure will be 14 oz., and so on. In Fig. 4 we have a syphon similar to that shown in



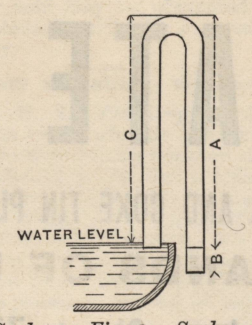
A Long Syphon.—Fig. 2.—*Syphon with Equal Legs.*

Fig. 2, except that it is inverted. The distances A and B are supposed to be the same as in Fig. 3. Now, supposing that B is equal to 1 foot, we shall have a "head" of water on the pipe just equal to 7 ounces per square inch. Of course the longer the pipe the smaller the bore, and the greater the number of bends in it the less will be the quantity of water which can be forced through it.

In estimating the length of the legs of a syphon to find out the difference in length, it is always necessary to measure from the water level. Syphon pipes frequently have equal legs, but as the one on the outside extends below the water line, they operate in the way that we have mentioned, the power being due to the length of the outside leg below the water line.

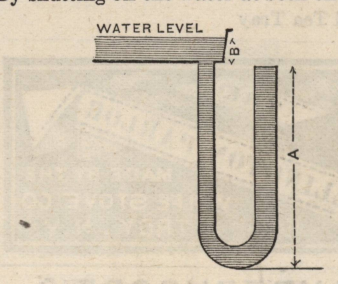
There is one point in the use of the ordinary syphon that must not be overlooked, and that is the danger from air accumulating at the top of the bend. All water from wells and springs contains air in solution. Indeed only water which has been boiled or distilled is found free from air. This may be seen any time by standing a glass of water in a warm place. In a short time air will be seen collecting upon the sides. Water going through a syphon as it passes over the bend at the top, has a constant tendency to leave behind it a portion of the air which it contains. Consequently we find that, in syphons with very long legs—or rather those whose legs have a great vertical hight from the surface of the water—air accumulates rapidly at the bend and ultimately cuts off the supply of the water. In large and long syphons a stop cock is frequently placed at the bend, so that the air may be allowed to escape. Sometimes a seat or coupling is left, so that a small air pump may be applied and the air drawn out.

In Fig. 1 our correspondent shows a pipe 84 feet long, with a gradual rise to the top, and an abrupt fall of 15 feet on the other leg of the syphon. We presume that the



A Long Syphon.—Fig. 3.—*Syphon with Unequal Legs.*

water is intended to flow toward the 15-foot leg, because that is shown as going down below the water line. So far as that portion of the pipe above the water line is concerned, the two legs are in balance, and the important question comes—how much depth is there available below that line? If there is only a foot or so, the pressure will be so small as to make it hardly worth while to put a small pipe down. In laying the rising portion, great care should be taken to preserve the grade, so that air bubbles may not accumulate along the line at "high" points, and so "air trap" the pipe and prevent the flow. At the very top means may be provided for removing the air, but this cannot be done along the line. One means of taking the air from the top of the bend is by an air chamber. When this is first put on it is charged with water. As the air collects it gradually rises into the chamber and displaces the water without stopping the flow. By shutting off the water at both ends of the



A Long Syphon.—Fig. 4.—*Shows an Inverted Syphon*

pipe, the plug may be taken from the top and the chamber refilled with water.

As the syphon depends upon atmospheric pressure for its means of operation, it cannot be used for lifts more than those of the ordinary suction pump. That is to say, at sea level the distance from the surface of the water to the top of the bend on the short side of the syphon cannot be greater than 32 feet, and generally it must be considerably less than this. As the hight of the syphon increases, the vertical length of the leg through which water can be drawn diminishes.

We think we have given our correspondent a sufficient number of hints to enable him to determine for himself whether the syphon of which he speaks will work.

The Quintard Iron Works, New York city, are building the sewerage pumping engines for the city of Boston, which will be located at the pumping station at Old Harbor Point, Dorchester. They are independent compound beam and fly-wheel engines, each working two single-acting plunger pumps. The steam cylinders are placed vertical and inverted, one high and one low pressure for each engine, with pistons connected to opposite ends of the beam. The pumps will hang under the engine plates in deep masonry pits, and the plungers will be connected by rods to the piston cross-heads. The high-pressure cylinders are 25½ inches, and the low-pressure ones 52 inches in diameter, with 9 feet stroke of piston. The pump plungers are 48 inches in diameter and 9 feet stroke. The engines are placed 18 feet apart from center to center. The fly-wheel will be 36 feet in diameter and weigh 36 tons. The speed of the engines for capacity will be 11 revolutions per minute. They will have a jet condenser, using salt water. The air pump will be double acting and horizontal. The working pressure of steam will be 100 pounds to the square inch. The capacity of each engine will be to raise with ease 25,000,000 standard gallons of sewage in 24 hours against a total head of 43 feet, when running at a speed not exceeding 12 double strokes of each pump per minute; the hight to which the sewage will be raised will vary, however, from 20 to 43 feet, the average being about 35 feet. These engines are, by contract limit, to be finished on or before March 1, 1881, and then are to be subjected to trial by experts, after which they will have to be maintained in good order for one year at the expense of the contractors. The boilers are being built by other bidders, under stringent rules and specifications.

We have reached a point where the utmost caution and prudence is demanded on the part of all who are in any way interested in or connected with the iron trade. As indicating the drift of opinion in well-informed circles, we give the following extract from a circular just received, issued by Hale, Cleveland, Bonnell & Co., of Chicago, under date of Feb. 9, 1880:

"In our annual circular of last February, the statement we then made concerning the activity of the iron market during the year 1879 has been fully realized.

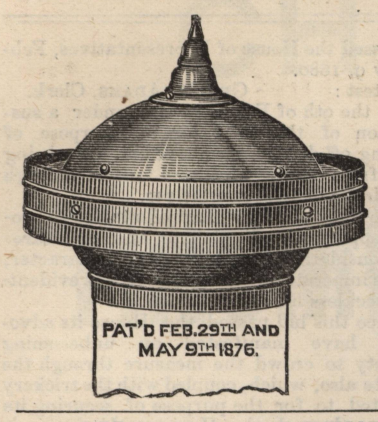
"The year upon which we have just entered promises to be one of still higher prices for iron in its various forms, resulting from a demand greatly exceeding the immediate ability of manufacturers to supply. This condition of the market bids fair to continue for a limited period, if our crops are abundant, with an unabated demand from abroad.

"To those who are accustomed to look below the surface of our commercial activities and study their conditions, the present 'boom' is of a nature to excite the gravest apprehensions, rather than the confident approval generally exhibited. Money will be rapidly accumulated, credits expanded, speculations of the wildest character engendered and entered into, and in the near future loss will follow loss, until the periodical panic returns, with the usual disastrous consequences.

"Such rapid appreciation of values, affecting every commodity, we may safely calculate will be followed by a correspondingly rapid decline, and we can only here present the result of experience and the unvarying testimony of the past, which continually teach the wisdom of caution and prudence in the conduct of commercial pursuits, against the hazardous experiments and unreflecting recklessness which, unfortunately, so often prevails in periods like the present."

Our trade report this week shows that in the local market pig iron is manifesting a tendency in the direction of weakness, although this tendency cannot be carried very far at the moment, for the reason that there is comparatively little iron likely to be offerred by makers, and not much, at present prices, by those who are holding iron in a speculative way. The New York market is also comparatively weak for Scotch iron, with heavy arrivals, most of which are going into store.

In Philadelphia we have to note further symptoms of weakness in Pig Iron, and reports are current of lots being offered at a material decline from nominal quotations. It is difficult to obtain particulars, however, and still more difficult to form any definite idea in regard to the immediate future of the market. The leading furnaces appear to be strong, although not asking as high figures as they were some time ago, the average reduction being about $1 per ton, although weakness is not so much among producers, as in lots held in second hands. There are a few companies, however, whose Iron is not much known among consumers, and they are said to be offering at about $36 for Forge, $37.50 for No. 2, and $39 for No. 1, all furnace delivery; in fact, we have heard of its being offered $1 less in some instances without leading to business. Others claim to have buyers on hand for all they can make, at $1 @ $2 higher figures than the above, but refuse to increase their engagements, even at outside prices. The market is so thoroughly mixed that we can only present the views held by the trade, and leave parties to judge for themselves in regard to the ultimate result. The majority seem to anticipate higher prices. They claim that the consumptive demand will necessitate a heavy production, and as ores are scarce and dear, if not further advanced they will at least maintain their present value; therefore Pig Iron will rule high. It is confidently predicted that the English market will be much higher, as the increased demand upon it so far has been confined almost exclusively to the United States. The revival of trade is believed to be world wide, and as soon as other countries (not yet affected) fall into line, it is thought the advance in England will be more rapid than it has been hitherto, that market being the objective point for all new orders. The older merchants also fall back on their previous experience, which, they say, after a long depression has always shown a somewhat corresponding period of prosperity. They claim, therefore, that if for no other reason, that of itself is sufficient to warrant the expectation of extreme rates during the balance of 1880. This view is supported by the well-established fact that every interest connected with the Iron trade is now in a prosperous condition. Not only the large establishments, but every little country shop is full of work; blacksmiths, wheelwrights, wagon builders and similar trades are steadily eating their way into stocks,



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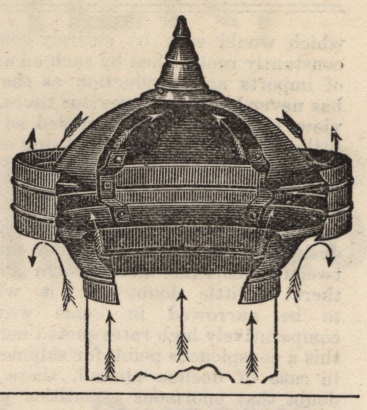

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Duplex Grate.

After six years' trial the **Duplex Grate** has proved to be all that can be desired. It is durable, economical of fuel, and satisfactory in every way. The fact of its adoption into their best goods by such leading Stove manufacturers as

Ransom Stove Works, Albany, N. Y.,
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Bussey, McLeod & Co., Troy, N. Y.,
Co-operative Foundry Co., Rochester, N. Y.,
The Union Stove Works, Peekskill, N. Y.,
Black & Germer, Erie, Pa.,
Sheeler, Buckwalter & Co., Rogers Ford, Pa.,
Raymond & Campbell, Middletown, Pa.,
The Union Stove and Mfg. Co., Pittston, Pa.,
A. Bradley & Co., Pittsburgh, Pa.,
Isaac A. Shepard & Co., Philadelphia,
Shantz & Keeley, Philadelphia,
Barstow Stove Co., Providence, R. I,
The Magee Furnace Co., Boston, Mass.,
The Stamford Foundry Co., Stamford, Conn.,
Schenectady Stove Co., Schenectady, N. Y.,
S. E. Olmstead & Co., Norwalk, Conn.,
J. Van Wormer & Co., Albany, N. Y.,
The Richmond Stove Co., Norwich, Conn.,
The Dighton Furnace Co., Taunton, Mass.,
The Walker & Pratt Mfg. Co., Boston, Mass.,
The Taunton Stove Co., Taunton, Mass.,
Wood, Bishop & Co., Bangor, Maine,
Smith & Anthony Stove Co., Boston, Mass.,
The Highland Foundry Co., Boston, Mass.,
Burdett, Smith & Co., Troy, N. Y.,
B. C. Bibb & Son, Baltimore, Md.,
Cox, Whiteman & Cox, Philadelphia, Penn.,
Co-operative Foundry Co., Somerset, Mass.,
The Taunton Iron Works, Taunton, Mass.,
Portland Stove Foundry Co., Portland, Maine,
Ely & Ramsay, New York,
Peck, Howard & Co., New York,
March, Brownback & Co., Limerick, Penn.,
Orr, Painter & Co., Reading, Penn.,
Bishop & Gavitt Stove Co., Attleboro, Mass.,
W. J. Keep, Troy, N. Y.,
Brand & Co., Milwaukee, Wis.,
Andrew B. Fales, Troy, N. Y.,
Potter & Co., Troy, N. Y.,
Corse & Co., Troy, N. Y.,
Swett, Quimby & Perry, Troy, N. Y.,
The Wolfe Stove Co., Troy, N. Y.,
Russell, Wheeler, Son & Co., Utica, N. Y.,
The Union Furnace Co., Taunton, Mass.,
The Co-operative Stove Works, Troy, N. Y.,
The Sill Stove Works, Rochester, N. Y.

and others,

insures its universal introduction, and is evidence of its great popularity where best known. We refer with pleasure to any of the above-named firms for facts in regard to the **Duplex Grate.**

We also invite your attention to

SMYTH'S

New Furnace Grate

with which the ashes and clinkers can be removed instantly by one motion of a lever, with the furnace entirely closed, and with which a continuous fire can be kept for any length of time. For information, or for license to manufacture, address

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WESTON DYNAMO-ELECTRIC MACHINE

NICKEL.

The rapid increase in the use of Nickel-Plating owing to the introduction of the Weston Machine and the very low price of nickel material, enables us to give greatly reduced estimates for complete outfits.

We are furnishing outfits specially adapted for Stove Work, giving a pure white deposit on plain or mat surfaces.

Outfits complete, with Dynamo-Electric Machine Tanks, Anodes, Solution, &c., &c., $250.

We beg to refer to the following Stove Manufacturers among 500 other houses using the Weston Machine: Richardson & Boynton, S. S. Jewett & Co., Fuller, Warren & Co. Perry & Co., Detroit Stove Works, Michigan Stove Co., Co-operative Stove Co., E. & C. Gurney, Hamilton & Toronto and many others.

INFRINGEMENTS.

We call attention to infringements of the Weston Machine, in which Automatic Switches are used to prevent change of current. The Weston Co. are owners by grant or purchase of all forms of Automatic Switches for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

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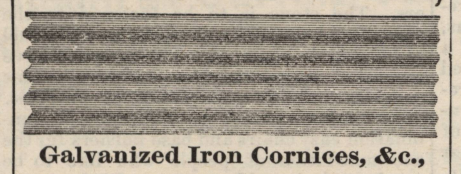
Send for circular. **Keystone Portable Forge Co.,** *218 Carter St., Philadelphia.*

A. KNISELY & CO.,

Manufacturers of

CORRUGATED IRON,



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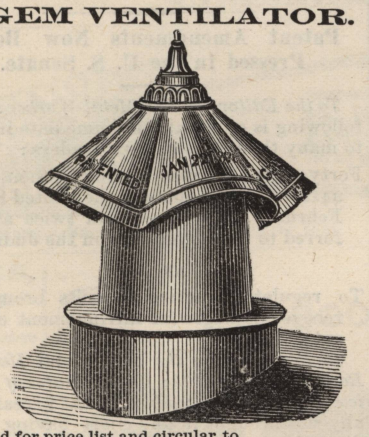

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PURCHASED BY

DAN'L W. RICHARDS & CO.,

Scrap Iron

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88 to 96 Mangin Street, N. Y.

SEND FOR QUOTATIONS.

POLISHING FELT.

We manufacture **WOOL FELT** of any quality, size, thickness or firmness in

SHEETS OR WHEELS,

FOR BUFFING AND POLISHING

NICKEL WORK ON STOVES, METALS,

STONE, WOOD, &c.

TINGUE, HOUSE & CO.,

56 Reade Street, **NEW YORK CITY.**

EXCELSIOR STOVE WORKS

MANUFACTURE

"Excelsior Cook," "Monumental Cook," "Enterprise Cook," "All Right Cook," all A. 1.

Also a variety of low-priced Cooking Stoves—"MINERVA," "COLUMBIA," "SIGNET," "ARION," "WASHINGTON," and a large assortment of Portable Ranges, in size, style and price to meet the demands of all classes. Also a large assortment of HEATING STOVES, adapted to all kinds of fuel. EXCELSIOR RANGES (Brick Set), Twelve Sizes Plain, and Eight Sizes Hot-Air, arranged to heat a room above. This is doubtless the most popular (Brick Set) Range ever made. EXCELSIOR HOT-AIR FURNACES, both Portable and Brick Set, Seventeen Different Sizes. Will give more heat in proportion to cost than any Furnaces in the market. SOIL PIPE heavy and light. SINKS of all sizes, and a large variety of PLUMBERS' GOODS. Also a complete assortment of Plain and Galvanized HOLLOW WARE, PLANTATION HOLLOW WARE, FARMERS' BOILERS, and MISCELLANEOUS GOODS. If you want the best Goods, at reasonable Prices, send for Circular and Price List to

ISAAC A. SHEPPARD & CO.,

N. E. Corner Fourth St. and Montgomery Ave.
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SUPERIOR QUALITY

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We are prepared to furnish

Stove Manufacturers,
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Of all sizes,
Cut to any pattern,
In quantities to suit,
At lowest prices.

No. 87 LIBERTY STREET, NEW YORK.

Assorted Packages North Carolina

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PREPARED EXPRESSLY FOR THE RETAIL TRADE.

2 lb. Package, Containing 8 Sizes, ...	¼ lb. 2 x5 " 3 x6	¼ lb. 4 x5 " 2½x4	¼ lb. 5 x7 " 3 x4	¼ lb. 3 x5 " 2½x5	Price **$6.00**
3 lb. Package, Containing 12 Sizes.....	¼ lb. 3 x6 " 2 x5 " 4 x7	¼ lb. 3 x5 " 3 x3 " 4 x5	¼ lb. 2½x5½ " 3½x4½ " 3 x4	¼ lb. 2½x4½ " 2 x4 " 5 x8	Price, **$8.50**
4 lb. Package, Containing 16 Sizes.....	¼ lb. 4½x5½ " 3 x4 " 2½x5½ " 3 x6	¼ lb. 3½x5½ " 2 x3 " 3 x5 " 3 x3	¼ lb. 2 x4 " 5 x7 " 2½x4 " 3½x4	¼ lb. 2½x3½ " 4 x5 " 2 x5 " 6 x7	Price, **$11.00**

Above Price Net Cash—No Discount. These Packages Delivered Free to any part of the United States.

MUNSELL & BROOKS, 115 Beekman st., New York.

which would soon be entirely gone if not constantly replenished by such an aggregate of imports and production as the country has never known in previous times. These views appear to be well founded, so that any little weakness for the time being carries no alarm to the trade generally. It is conceded, however, that Pig Metal is relatively the dearest article in the market, and moderate concessions are regarded as very desirable. There is too much margin between American and foreign Pigs, and there is little doubt but it will have to be narrowed in some way. The comparatively high rates quoted here render this a conspicuous point for shipments, and in case of decline abroad, there is little doubt that enormous quantities would be unloaded in the United States at some price. This, at present, is the weak spot, and prices are too much under influences from outside sources to warrant very confident predictions as to the immediate future, and to this, in a measure, we attribute the feverish and unsettled condition of the market. It is likely, however, that values are settling down to a safe point, which, when established, will doubtless lead to a very active demand. In the meantime we quote: No. 1 Foundry, $40 @ $42; No. 2 Foundry, $39 @ $40; Gray Forge, $38 @ $40; North of England Irons, $32 @ $34; Eglinton, $35; Gartsherrie, $37 @ $38; the latter quotations are for small lots from store; lots to arrive are quoted at about $3 ℔ ton less money.

With regard to the foreign supply of iron, an eminent Philadelphia authority, Mr. W. E. S. Baker, of the Duncannon Iron Company, also secretary of the Eastern Iron Association, speaks guardedly as follows, in a circular letter dated February 14th.

"We have just received the official list of exports from Great Britain for 1878 and 1879, and the figures are significant, if not startling. They plainly show that the exports from Great Britain of Pig Iron, Bar Iron, Iron and Steel Rails, Hardware, &c., were no greater in 1879 than in 1878, except to the United States, and of Old Rails, Scraps, &c., the excess in 1879 over 1878 was but 14,000 tons, except to the United States. This reveals the fact that the revival of business, so apparent in Britain and the United States, had not extended to the other countries of the world which depend upon Great Britain for their supplies of Iron. This query then arises: As the depression was universal, having been felt in all nations, will not the reaction and revival be developed sooner or later? If so, what will be the effect upon the Iron trade of Great Britain? If she can meet all other demands and still export enough to the United States to supply our enormous wants, then prices may not rule higher than at present; but if a sudden and sharp demand from abroad, in addition to that from America, should exceed British ability to supply it, there will be higher prices in both countries, if not a Pig Iron famine in the United States."

In Pittsburgh the iron market is reported rather more active, and a firmer and more hopeful feeling obtains on the part of producers. Some of them predict that another boom is near at hand, but the most of the trade would prefer to have the market settle down at about current rates, believing that a further boom will, in the long run, be detrimental to the best interests of all concerned. That the market is easier there is no denying, and some of the sales within the past two weeks show a decline of from $1 to $2 ℔ ton; but holders generally are refusing to make any concessions, from which it is evident that they have hopes of an early reaction, of which, as already intimated, there are favorable indications at the present time. Prices may be quoted at $40 cash, for Neutral Forge, $43 @ $45 for all-ore Red Short, and $42 @ $45 for Foundry.

The Cincinnati market is reported quiet. Messrs. E. L. Harper & Co. say: Speculators were generally induced to close out their Iron at the large margins obtainable during the brisk trade of the past 60 days, and the stocks at the furnaces were also further reduced. In this way sufficient quantities were tranferred to buyers' yards to supply most of what is needed at present. Under these circumstances they are not entering the market beyond a moderate extent, and it is not probable a brisk demand will start again before the opening of the spring trade in March. During the lull in December some of the prominent buyers, discerning the advantage of placing orders before the expected revival in January, improved the opportunity. Possibly a similar movement may develop shortly, and afford an active trade sooner than expected, but in any event the usual large movement may be looked forward for during March and April, which are generally the largest in volume, as February is about the smallest of any month during the year. No disposition is manifest to press sales, and prices continue firm.

HOT-BLAST FOUNDRY.	4 mos.
Hanging Rock C. C., No. 1	$44.50 @ 45.50
" C. C., No. 2	42.50 @ 44.50
Southern C. C.	43.50 @ 44.50
" " No. 2	41.50 @ 43.00
Strong Coke	43.50 @ 44.50
" " No. 2	41.50 @ 42.50
Soft Stonecoal	39.00 @ 41.00
" " No. 2	37.00 @ 39.00
Open Silver Gray	40.00 @ . . .

Andrews, Wilder & Co., Boston, send us an illustrated circular of a new range by J. M. Read, which possesses many features of novelty in construction and operation. It has six holes, and its flues are so arranged as to circulate the heat around two sheet iron ovens placed side by side. It is said to have an unusual baking and cooking capacity, and to be economical of fuel.

Detroit Ornamental Castings.

We are indebted to our Detroit friends for some very pretty novelties in the way of ornamental castings. From the Michigan Stove Company we have a cast-iron cribbage board, finished in nickel and gold, which is in every respect a new and beautiful device. It is in the shape of a triangle, with the center filled with scroll-work. The Detroit Stove Works send us samples of nickel-plated anvils made as paper weights, and horse-shoe wall ornaments finished in nickel. They are exceedingly pretty, and show skillful molding and finishing.

A Novelty in Foot Warmers

has been introduced for public comfort in cabs and other vehicles in France. A sheet-iron box is used with a sliding drawer, over which the air, which is admitted at one end, may pass before it escapes at holes in the other end. Into this drawer a briquette of pure compressed carbon raised to a red heat is placed, and it continues to burn there, without giving forth any disagreeable odor, for about 14 hours. We can see no good reason why a line of goods of this kind should not be very saleable in the colder districts of this country.

Steam Heating in Brooklyn.

A few days ago the Water and Drainage Committee of the Brooklyn Common Council reported on the petition of the Empire Heating and Power Company, represented by Henry W. Shepard and John D. Baker, for permission to lay pipes through the streets for the transmission of steam, heated water and air for heating water and other purposes. The committee reported that a careful examination of the scheme had been made; that no one had appeared to oppose it, and that granting the permission would be for the interests of the city; and recommended that the permission be granted on condition that the company give a bond to the city ($100,000) to secure it from all damage; pay to the city 3 cents per lineal foot of mains and lateral and service pipes laid; heat the public buildings at one-third less than the cost of heating them in 1878, and furnish steam for cleaning the streets from snow and ice and for the use of fire engines at a reasonable cost. Aldermen O'Connell, Ray, Dimon, Roberts, Baird and others spoke in regard to the matter. Mr. Dimon said that there were 500 miles of paved streets in the city, and that 3 cents a foot of the mains, lateral and service pipes would amount to about $500 a mile, and he considered that the company ought not to be asked to pay more than that. Alderman Seaman moved that the company be required to begin operations within six months, and to heat the public buildings within a year if required. Alderman Roberts moved as an amendment that the company be required to pay 2½ per cent. of its net earnings to the city. This was lost by a vote of 10 to 15, and a motion to lay the matter over for two weeks was also defeated. Mr. Seaman's motion was lost, and the report was then adopted by 18 to 7.

Water Street, N. Y.

The correspondent who supplemented Jeems' interesting history of Water street, by a letter which we published in last week's issue, over the signature "Old Water Street Boy," has sent the following additional notes, which we are sure will be found of great interest to many of our readers:

Wm. T. James made the "Saddle Bag" cook stove, which had a large sale in its day. His store was at 295 Water street, at present occupied by Bramhall, Deane & Co. Mr. James sold out the business to John W. James, who continued the manufacturing of the same stove. Wm. T. James built a machine shop, subsequently, in Eldridge street, made the first locomotive on the Hudson road and died leaving quite a fortune. John W. James made much money, but died poor.

Mr. McGregor invented the "McGregor" stove, and Messrs. Thompson & Munsell were manufacturers thereof, and subsequently a change in the firm took place, Mr. Munsell's brother buying in, and the firm changed to Munsell & Thompson. The new firm prospered, and have made much money.

Wm. Cunningham carried on the business of making stoves at No. 233 Water street, and died leaving quite a fortune.

Samuel Peirce introduced a two-oven flat-top range after 1840; had a store on Fulton street, became a special maker of various stoves, connected with parties in Troy and afterward in Boston, where he died.

Captain Beebe made a sheet-iron two-oven range. He had been a ship-master, and turned his attention to range-making about 1841. He connected himself with parties from whom the respectable house of Janes & Kirtland has grown. Captain Beebe died some years since.

J. L. Mott commenced making stoves about 1836, in Water street, No. 231½. He obtained many patents for stoves and other things, and subsequently moved to 264 and 266 Water street, and, by real estate and his stove business, amassed quite a fortune, which is being handled by his son very well.

W. E. Barrows made a two-oven range and a furnace, commencing in New York in 1842, or thereabouts. He made money, was an inventor, and undertook to improve a steam engine on the rotary principle, but before he had succeeded was taken ill and died.

Mr. Tompkins made the first fire-place heater. He had a place of business on Fulton avenue, Brooklyn, since which time various other parties have made many styles.

Mr. Hedenburgh made the first heater to heat rooms by registers in the floor and elsewhere. He was brother-in-law to Gould Thorp. He did business in Division street.

Mr. Rolhaus was connected with Mr. Barrons in range and furnace business, and after their separation made the "Knickerbocker" range, and is located in Water street, where he has made money.

Messrs. Abendroth Brothers have been in the stove and furnace business many years, and have made a fortune.

The Union Stove Works is the result of the business established by R. R. Finch & Co. They have built up a strong house.

The National Stove Works is the outcome of Sanford, Truslow & Co., who came from Whitney & Sanford and from Whitney, Mantanyea & Co. They have been long in the stove trade.

Mr. Watson Sanford has introduced many new stoves and ranges.

Messrs. Richardson & Boynton are an established house. They commenced in Broadway and went under a cloud, from which they have come forth in colors bright and stand at the head of the heap. May they count themselves never less.

Nicholas Cort hung his sign out in the Bowery in his earlier days, and finally established his business in the stove trade in Water street.

Samuel Utter was one of the hardest working men in the stove trade. Having gathered of this world's goods, he retired to the country on a farm where he labored and toiled as long as he lived, leaving a son in the stove business.

M. N. Stanley & Co. came from Vermont, and established themselves in the stove business in Water street; were the inventors of the "Rotary" stove, and made a pile of money with it. They also made a cast-iron heating stove, which is, to some extent, now in use.

Thomas Frazier carried on the stove business at 206 Water street for many years. He was a very respectable man and did a fair trade. He left quite a family and some property. AN OLD WATER STREET BOY.

Something New in Stoves.

A Pennsylvania exchange prints the following interesting item of news: "The Pennsylvania Railroad Company is building stoves for the comfort of the snow shovelers. The stove is to be fastened to the shoveler's back while at work, and the fuel to be used is charcoal. The company have several of them ready for use now." This suggests infinite possibilities of progress. Why not have pocket base burners, or combination easy chairs and base burners for the accommodation of people who like to be comfortable in cold weather. Little stoves made to strap on one's feet of a cold night on going to bed would also be handy. But if this is to be the new direction of progress, we must have a new basis price—6½ cents per pound would never do.

Patent Amendments Now Being Pressed in the U. S. Senate.

To the Editor of The Metal Worker: The following is of great and immediate interest to many thousands of your readers:

Forty-sixth Congress, Second Session, H. R. 4412.—In the Senate of the United States, February, 10, 1880.—Read twice and referred to the Committee on the Judiciary.

AN ACT

To regulate practice in suits brought to recover damages for infringement of patents.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That hereafter in any suit brought in any court having jurisdiction in patent cases for an alleged use or infringement of any patented article, device, process, invention or discovery, where it shall appear that the defendant in such suit purchased the same in good faith for his own personal use from the manufacturer thereof, or from a person or firm engaged in the open sale or practical application thereof, and applied the same for and to his own use and not for sale, if the plaintiff shall recover a judgment for $5 or less as damages, the court shall adjudge that he pay all costs of suit; and if the plaintiff shall not recover the sum of $20 or over, the court shall adjudge him to pay all his own costs, unless it shall also appear that the defendant, at the time of such purchase or practical application, had knowledge or actual notice of the existence of such patent; provided that nothing contained herein shall apply to articles manufactured outside of the United States,

Passed the House of Representatives, February 9, 1880.

Attest: GEO. M. ADAMS, Clerk.

On the 9th of February last, under a suspension of the rules for the purpose of cutting off debate, the above bill, after being read from manuscript, was rushed through the House of Representatives.

The duty of every Representative to provide opportunity for debate, and give careful consideration to bills of this character, seems imperative, but the above was evidently a reckless bit of legislation.

Since this bill passed the House its advocates have manifested an unbecoming anxiety to crowd the measure through the Senate also, which, coupled with the trickery resorted to for the purpose of securing its passage through the House, and printing it in the Congressional Record as House Record "4419," instead of giving its correct number, which was "4412," justifies the suspicion that this innocent-appearing bill of nineteen lines covers a cat in the meal somewhere.

The fact is, House Bill 4412 is but the entering wedge; the real aim of its promoters is to overturn the entire patent system, and virtually confiscate all property in existing patents.

This explains why the bill was introduced through other than the Patent Committee (whose action was being watched), accounts for the disposition to prevent its features from being discussed, and also suggests a motive for printing the wrong number in the *Congressional Record*.

The advocates of No. 4412 proclaim that it is a bill to prevent claims being made against users of small patented articles under cover of patent papers which will not bear investigation, and that by such means large sums have been extorted from the users of devices not entitled to the protection of a patent, because it was found cheaper to pay the demand than to contest the claim.

If such is the object of bill 4412, let it be amended so that none of its provisions shall apply to claims made under patents pronounced valid by a United States court of competent jurisdiction.

Such an amendment would in no way lessen the efficacy of this bill as a protection against fraudulent patent claims, while it would enable honest inventors to secure their rights in inventions whereon a moderate royalty is claimed, as well as from those where the royalty demanded is much larger.

Bill 4412 would compel inventors to demand above $20 royalty on inventions they would otherwise offer to the public for a much less sum, but for the penalty therein affixed against all who shall fail to collect a larger sum than $20 through the courts.

If the advocates of this legislative monstrosity (4412) would frame a bill to enact that, hereafter, no invention shall be entitled to protection under the Patent Laws of the United States, unless its royalty shall be fixed above $20 (except only such discoveries as it is impracticable for irresponsible persons to sell or apply), they would present the issue involved in Act 4412 plainly.

Bill 4412 reads: "If the plaintiff shall recover a judgement for $5 or less as damages, the court shall adjudge that he pay all costs of suit, and if the plaintiff shall not recover the sum of $20 or over, the court shall adjudge him to pay all his own costs." With the pretense of fairness, it provides that the plaintiff who has shown himself entitled to recover before the courts, may escape the penalty attached to the recovery of not more than $20, by proving what every man familiar with patent suits knows it is quite impossible to prove.

In other words, royalties of $20 or less could only be collected through the courts, under the most favorable circumstances, by the expenditure of five or ten times the sum to be collected, if patent amendment 4412 should become a law.

Our government ought not to attempt to violate contracts entered into with its citizens who, having made known their discoveries (in fulfillment of their part of the obligation), would be left without a remedy should they be refused the protection of the courts.

Let each and every holder of a patent protest against the violation of such contracts. Let them remember that Act 4412 is but the forerunner of other acts of injustice, which those who are in favor of abolishing the Patent Laws have in contemplation.

There are hundreds of thousands of industrious citizens interested in patents who are also entitled to vote. Let each one of them write to the Senators representing his State (or to any Senator of the United States), demanding to be protected from demagogical legislation.

Let them respectfully ask that the Senate consider Act 4412 carefully. A majority of the Senators will oppose the bill when its objects are fully understood by them.

If any should vote for it after having their attention called to it, they may then reasonably be held accountable for their acts.

Much of the responsibility for unjust enactments is fairly chargeable to the supineness of those directly affected by them.

Let patentees and all interested in patents bestir themselves, as patent amendment 4412 is now pending in the United States Senate and being pressed by parties opposed to patents. INVENTOR.

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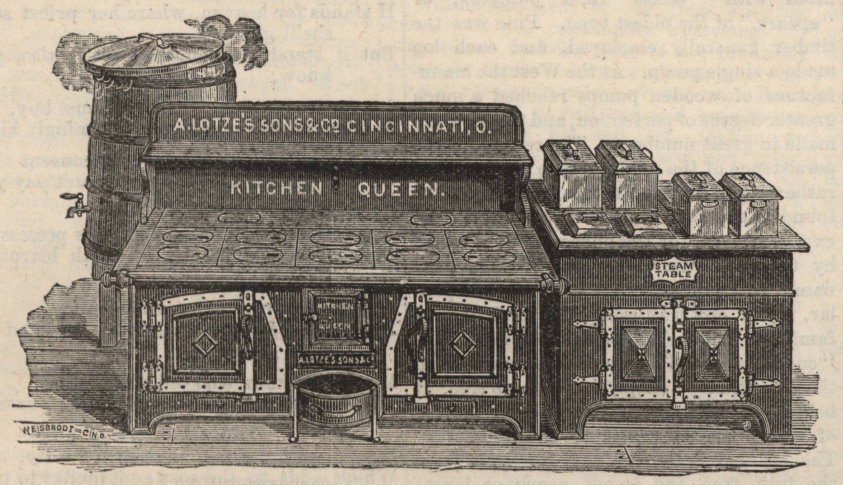

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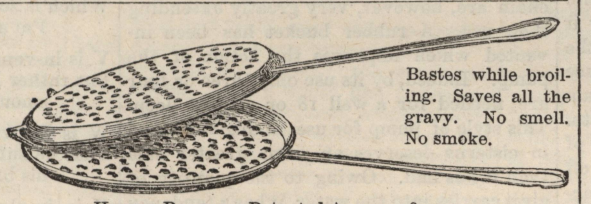

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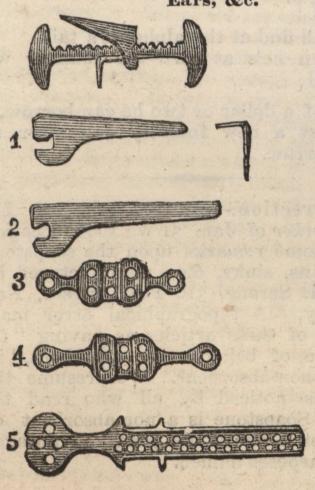

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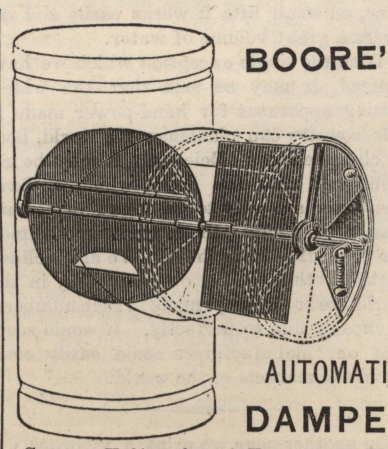

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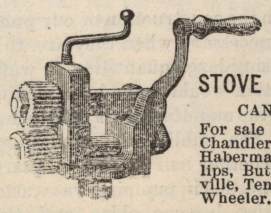

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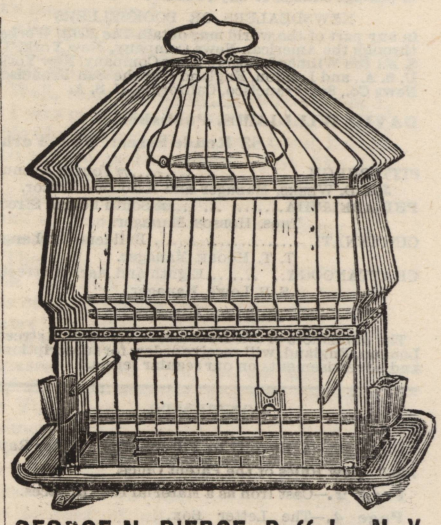

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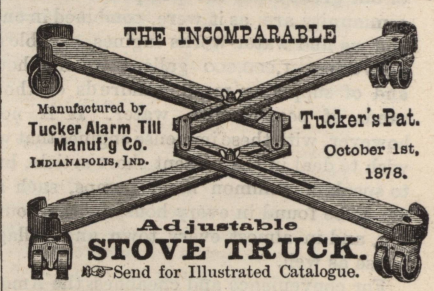

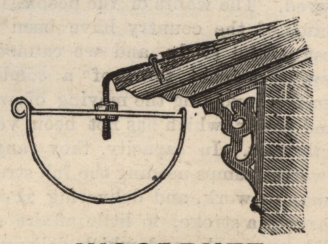

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The American Hand Pump.

The manufacture of pumps and apparatus for raising water is one of the most extensive industries in the United States. Water is an article as absolutely essential to the life of animals as food, and as water supplies are generally below the surface of the ground, it follows that every individual must have at hand the means for drawing water from various depths. Hence we see the reason for their universal use. In many of our great cities the pumps of the whole community are, as it were, combined in one, and we find water-works engines, capable of delivering 1,000,000 gallons in one hour and of supplying many hundreds of thousands of people with water. It is not, however, with these immense engines that we wish to deal in the present short article, but to speak of common hand pumps, such as are to be found in every house in the country, and in almost every town and village house as well.

For convenience and cheapness the American domestic pump can hardly be improved. The wants of the people in every section of the country have been made a most careful study, and we cannot at the present moment think of a condition or situation involving the moving of water by hand power, which has not been very perfectly met. In capacity, they range from powerful pumps needing the full strength of a man to work, and delivering almost five quarts at a stroke, to little affairs which a child can work, and which deliver half a pint at a stroke. In price there is little to be desired, since for from $5 to $5.50 a pump can be obtained capable of lifting a quart of water at every stroke from a well or cistern of moderate depth, while smaller sizes can be obtained for prices as low as $3.50 or $4. In looking over catalogues of pump makers and watching the inventions of those who are engaged in bringing out new things in this line, one cannot fail to be struck with the fact that the improvements are of the smallest and most trifling kind. In other words, we find that the hand pump is, in many respects, almost perfect. Examining one of these pumps, we see that an immense amount of practical ingenuity has been expended upon it. Spout, handle, plunger, stand, and means for coupling have all had a great deal of thought bestowed upon them. To a person unskilled in the mechanic arts, one of these pumps would seem to be the very incarnation of simplicity. But simplicity, ease of manufacture, and consequent cheapness, are not to be obtained without the most careful study. It may be accepted as an axiom, that simplicity marks the great inventor and distinguishes his work from that of the inferior man. Taking the ordinary American outdoor pump, such as may be placed upon a platform over a well, we find that we may have the handle at either side or at the back; that it can be used in a well varying from 3 to 90 or 100 feet in depth; that it is equally useful in driven or dug wells, and that it is capable of doing almost any work which may be required of it. Its durability seems to be beyond the knowledge of any one generation, for we find that when apparently quite worn out by hard and constant use, a few trifling repairs, which can be obtained from almost any tinsmith's shop, puts the pump into as good condition as when it was first set up. In cold climates no fear of freezing need trouble the user, for by simply lifting the handle the valve is tripped and the water drains from all portions of the pump back to the well. It must be understood that we are now speaking of the characteristics of all American yard or well "suction" pumps. They are to be found in the lists of every manufacturer in the country, so far as we know. There are probably more of them made than of any other kind, and they are known in almost every corner of the world—certainly in every civilized country.

The next great class is that known as the force pump. Although this kind does not invariably permit a change of handle from side to side, it may be found with most of the conveniences of the other type. The variety of hand force pumps is, however, much greater than that of any other style. In them, too, the amount of power required is much greater, and the losses encountered by the water in passing through them becomes a serious matter, while in the general form and arrangement there is very little more to be desired than small points of internal construction that should have the most careful attention from the manufacturer.

The first point, when pumps of this class are defective, is in the size of the suction opening. This is usually very much contracted, and is frequently located so that the water takes a sharp bend soon after entering the pump. This is most frequently the case with all kinds mounted horizontally. For convenience and cheapness of manufacture the valve seats and valves are made as small as possible, and very frequently, when brass seats are used, the lower sides have sharp edges projecting into the water-way, so that while nominally it is without a contraction, practically the valve seat offers nearly as much resistance to the flow of the water as if the stream passed through a hole in a thin plate. Right-angle bends across sharp edges of castings are very often found, which take off large percentages from the theoretical capacity. In ordinary use, to supply water in dwellings or for stock, a little more or less loss of power may not be noticed; but when it is necessary to fill a tank, as is common in cities, or when a stream is required for washing carriages or putting out a fire, every ounce of power wasted becomes a serious matter.

A change in the construction of our pumps is absolutely necessary when they are to be used for raising large quantities of water. The construction would have been modified long ago had the manufacturers felt the need of so doing. The public who used pumps had no care whether half or only a quarter of the power needed in pumping was wasted. As communities become older and their needs greater, water raising becomes more important. Larger quantities of water are required, and the power needed becomes costly. We may expect, therefore, that as more attention is paid to the question of pumping, we shall have the internal construction of the pumps so modified as to make the work as light as possible.

At the present time the amount of power required to lift a given quantity of water through any required number of feet, is usually about 15 or 20 per cent. more than theory would call for. There is no less than 15 per cent. wasted in overcoming the friction of the pump, the losses by water slipping through the valves, and by the friction of the water in the pipes. This amount is much greater than is really necessary, and by proper construction may probably be reduced to one-third of its present amount, or even less.

In the matter of materials for pumps and pipes, there is some room for improvement. The common cast-iron body, with its leather valves and iron or brass valve seats, is all that could be desired under ordinary conditions; but we find that in driven wells there is a growing tendency to use galvanized iron, because the pipe does not rust. Probably with the introduction of iron pipes, well protected from rust by some other means, the use of galvanized pipe will be gradually abandoned. Certain manufacturers, in order to diminish the annoyance from rust, which in some waters is considerable, line the inside of their pump cylinders with glass, and thus obtain a non-corrosive surface. These cylinders are said to last very well. Wooden pumps almost deserve an article by themselves. Seventy-five years ago wood was largely used for pump-making in the Eastern States. There are to-day in Brooklyn a great many pumps in street wells made from large logs, bored out and fitted with "boxes" and plungers, or "spears," of the oldest type. Pine was the timber generally employed, and each log made a single pump. At the West the manufacture of wooden pumps reached a much greater degree of perfection, and they are still made in great numbers. The reason for the persistence of the manufacture at the West rather than in the East, is probably to be found in the fact that the West has a most excellent wood for the purpose. It is called by the trade "cucumber wood." The local name is "poplar," but it is not a poplar, nor in any way related to the botanical family to which the poplar belongs. The "cucumber-wood" pumps are made from the *Liriodendron tulipefera*, or tulip tree. It belongs to the well-known magnolia family, of which the cucumber tree is a member. The latter, however, is very different from the tulip tree, and is not nearly so large. The poplars, or aspens, belong to the *Salicaceæ*, or willow, family, and their wood is almost valueless under water. The wood of the tulip tree, however, seems entirely unaffected by water and wears remarkably well.

Instead of one pump from each tree, a great number are obtained by means of improved methods of manufacture and improved machinery. Most dealers in pumps can supply wooden pump tubing. It is usually square upon the outside. The waterway, however, is circular. Some tubes, cut out with hollow augers, are circular both inside and out.

Wood is almost the only material used for chain-pump tubes. Pumps of this kind were at one time very extensively used, but for a few years past they have not been popular. Improved tubing, better buckets and chain are, however, very greatly extending their use. A rubber bucket has been invented which improves the action of the pump. Indeed, by its use only three or four are needed for a well 18 or 20 feet deep. This style of pump for use in dug wells and in cisterns deserves an even greater sale than it has had. Owing to the quantity of air it carries into the water, it has a tendency to keep the water sweet, while, at the same time, on small lifts it works easily and delivers a great volume of water.

With the single exception which we have noticed, it may be said that the water-raising apparatus for hand-power made in this country can challenge the world, both in cheapness and efficiency. It must be remembered that the faults which we have mentioned are only to be found in certain classes of pumps—those in most common use being free from them. We are inclined to think that in no other country in the world are hand pumps made in such numbers, so cheaply and so perfectly. It would seem that our manufacturers could easily command the markets of the world.

On another page we print a vigorous letter from "An Inventor," discussing the bill which lately passed the House "To regulate practice in suits brought to recover damages for infringement of patent. (H. R. 4412)." Our correspondent deals with this bill none too severely, and his call upon inventors and all who are interested in patents to come to the defense of their rights, should bring a prompt response from all parts of the country. This bill is one of those sweeping measures which are full of mischief, and which mean a great deal more than would appear from a casual reading.

The A B C of the Stove Business.

An Easy Lesson for Beginners.

A 's the advance which, in prices, was brought about
Several months after 'twas talked of and thought about.

B is the "boom" which began in the fall,
And which threatens to "jibe" if it's struck by a squall.

C is for circulars sent to the trade,
Explaining why shipments so long were delayed.

D is the drummer who travels by rail
And predicts for your goods a phenomenal sale.

E is experience, gained at the cost
Of the money you've sunk and the time you have lost.

F is the fortune you're going to make—
Unless, in the meantime, you happen to break.

G is the girl who can never be tought to be
As careful in using a stove as she ought to be.

H stands for heaven, where her priest says she'll go—
But it stands for another place also, you know.

I is for iron which, when you must buy,
Is uncommonly scarce and alarmingly high.

J is for judgments obtained by consent
Of the dealers who fail and can't pay you a cent.

K is the knowledge that founders possess;
But a good deal besides is worth learning, I guess.

L is the lawyer you have to retain,
And who loses the suits you expected to gain.

M is for molders who tell you one day
They've decided to strike for an increase of pay.

N is for nickel—in stove trim a vanity,
Which adds to the cost and incites to profanity.

O is an ominous word in the trade,
For a great deal is *owed* that will never be paid.

P is the patterns you lavish your cash on,
And which, in a month or two, go out of fashion.

Q stands for questions of law and of equity
Involved in the suits you are in or expect to be.

R of repairs is suggestive; but how
Shall we eucher the "pirates" who furnish them now?

S is the "Syndicate," solemn and grand,
Which has taken good care not to show us its hand.

T is in trouble and never gets out—
And the same may be said of most founders, no doubt.

U is for unsatisfactory trade,
Which is something we've learned to expect, I'm afraid.

V is in-vention; you'd better not touch it,
But rather look round for a good thing and smouch it.

W is the wrongs the inventor complains
That he suffers when robbed of the fruits of his brains.

X is, in algebra, used to express
The unknown—and will stand for Xpenses, I guess.

"Y?" asks the founder, in sorrow, "O! why,
To make money in stoves did I foolishly try?"

Z we shall find at the alphabet's tail,
And when he's at zero the founder will fail;

& then, if a dollar or two he can borrow,
He'll start a new foundry day after tomorrow.

A Correction.—In the issue of *The Metal Worker* of Jan. 31 we took occasion to make some remarks upon the soapstone wash basins, sinks, &c., manufactured by Mr. J. H. Serene, 310 Pearl street, New York city. A typographical error made us speak of these articles as having "the advantage of being more absorbent," instead of non-absorbent. We presume the error was noticed by all who read the article. Soapstone is a non-absorbent of water, hence one of its great advantages for the purposes named.

The Late Boom at Delmonico's.

The governor got a telegram during the late Stove Convention, inviting him to attend a feed of the members at Mr. Delmonico's tavern, corner of Fifth avenue and Twenty-sixth street, on the evening of the 4th of February, at 7 o'clock p. m., sharp. As he don't go about much without me, on account of the slippery weather, I went with him down to York. When we got there the boss met a couple of old jours, and somehow when the evening came the man who pays me my wages was unable to attend, on account of the friendly offices of his ancient friends the jours, who had let the old man slip on an orange peel and injure the rear part of his head. The doctor says his *medulla oblongata* is affected. All this happened because he strayed from me. So the old man insisted upon me taking his place. I was so scared at the idea of getting near the big guns that I declined; besides, I had patronized the peanut roasters so much that it seemed as if I couldn't hold another nut. But as the boss threatened to discharge me unless I went, I went. Great Scott! Wasn't I nervous when I entered the tavern. I nearly lost the remainder of my '49 coat by being jammed in between two ladies, on account of the great crush of people there, besides getting my hand badly scratched with a lady's diamond ring rubbing against it. They apologized sweetly, but, says I: "I ain't hurt, but look at your white cloaks." As I am a living sinner they had a splendid jet black stripe down them. They didn't get mad, but I did, smouching stove polish off a fellow's coat that way. On getting upstairs I was ushered into a magnificent room, where I found the "rulers of the stove navee" assembled. A death-like stillness prevailed. I quietly took a seat, and breathlessly awaited the opening prayer. Much whispering went on, but no one said anything out loud; finally two large doors opened, and we were invited te enter. Such a sight! By the great boot in Chatham street, I never see the like before. There was a huge table spread, flowers, silver, decorated china, &c., and the room was furnished good enough for a king. Anyhow, it was good enough for me. They tell me that Mr. Delmonico keeps the best tavern in York. All the first-class tarriers go there. He had literally carried out the scriptural injunction: "Bring in the table and spread a linen cloth thereon, and set in order the things that are to be set in order upon it." As soon as we were seated some gentlemen, who I supposed were sons of the host, commenced to bring in the nourishment. Didn't I regret that I had gorged myself with peanuts so much? However, I made the best of it, and dear me how the things did disappear. I should smile if they didn't.

But, my, how quiet we were! You could hear a house fall; yet the things kept disappearing. Pretty soon a gentleman coughed. All eyes were turned on him; but he smothered down the balance of the cough, and all was quiet for a half hour. Then another sneezed; he got scared at his noise; that made his next-door neighbor smile a little—just a little. Then the gent that coughed asked the smiler what made him smole. He said he was tickled. The thing was getting heavy; peanuts were getting restive? and altogether I did not feel that I was having the kind of a time that the monkey and the parrot had when they came over on the Mayflower. But suddenly I heard a report like a pistol. Then people began to talk, and altogether I noticed quite an excitement at the foot of the table, which gradually extended to our end. This was caused by the opening of the famous "shampaging" water, I believe they call it, and the report was caused by the corks going aloft. That water made a complete transformation of the room in a jiffy. Where there were a hundred candles lit before, now there were thousands, and such a jolly lot of people, no one would believe. What a famous thing that water is to limber you up! Tongues that didn't wag started the instant the water struck them, and never ceased till the water ran dry. Then the smokables were produced; none of the kind the drummers stuff on you for an imported. No, sir! them smokers was genuine. Then the chairman gracefully announced the toasts, preceding each with appropriate remarks. Then the speakers got up and responded. Then the famous water was called for to moisten the mouth of the speaker and to wash the words down the hearers' throats. "Here, you son of a gun," says one party to one of the gentlemen, whom I supposed were Del.'s sons, instead of which they were Gun's sons, probably some relative; "put a half dozen of them bottles here—you hear, sirrah!" That man put his thumbs on his vest and leaned back. You bet he looked first class while he waited for the water.

During the time we were feeding the gentlemen who were so kindly serving us were kept busily engaged in injecting sundry small fluid interpolations of various kinds into vessels of glass that were placed in groups alongside of each plate. Whatever it was, it was very toothsome and extensively patronized. After they had filled themselves a little the chairman announced the first toast, which was "the City of New York. May it always have a welcome for a young man from the country." The gentleman who responded to this toast was entirely unknown to the members; consequently he felt quite diffident at being called upon. He related a story of two tailors of Tooley street, whose sister was about embarking for Siberia, and how, when she arrived there, she received no welcome, because of a circumstance which is too long to relate here. "Yes, gentleman, I can appreciate the hospitality of New York. I was born on a farm, lived on a farm, died on——no, not dead yet, but expect to, and never knew much about city life until a few weeks ago. 'Beats the country; don't it? At least I suppose it does, judging by the way you gentlemen were frisking around last night, just like colts. Now, there must be something in the hospitality of New York that makes it so attractive, and I think she has always her arms open, particularly for us from the country. I like New York, and if I am spared I intend to come here next convention and try her arms again."

One and all responded heartily to this speech, and the aged parties particularly resolved to attend the call to arms. A gentleman from Troy said "they was the finest he ever saw."

High art was the next one. "May its canons yet recognize the decorative value of horizontal stripes in two colors."

"High art is a very difficult subject for me to handle," the speaker said. "You have had a beautiful illustration to-day of some artistic principles in connection with our business, but for genuine high art you have only to examine the various structures as produced by many of us, in company with some high art expert. You will find he will be like some of our great scientific men, who are continually analyzing our atmosphere, and find that we are breathing poison by the barrel every minute, and that we will surely die unless we reform. But a great many of us still live, and hope to live on in spite of the bad air. While we acknowledge our manifold sins and transgressions against our high art brethren, we have heard of no one yet who has died or has been ruined from our neglect in this respect. We live in hopes, that the day will yet come when our structures will be used as studies for art students, as the old cathedrals, &c., are used at present. We only pay 50 cents for horizontal stripes in two colors, but our competitors pay more for plain goods. Decoration is cheap with us."

"The West, whither the Star of Empire takes its way." I should judge the gentleman who responded to this was from the East. At least, he did not boost the star much.

"Well boys," he began, "guess the West is quite a place. Looks very much like it, and I rather think it would be very wise for us people East to look sharp after our good friends from the West. You see they get the sun over in that direction part of the day, but if we didn't raise it for them every day they couldn't get along, and that's the way with our stoves. After all, if the West wants good stoves she always comes East for them, and I hope they will always act as wisely in the future."

A party from the West said they might, and again they mightn't. Guess the latter hit it.

"Peace and good will," was responded to by a gentleman who said he always favored it. He believed in killing people who didn't. He never had anything to do with a lawsuit unless he had a dead sure thing on winning it, and he would spend his last dollar to buy the judge rather than have injustice done to his neighbor. "I am emphatically for peace at anybody's cost." Loud applause followed this peaceful oration.

"Nickel and frills—may they go hand in hand where stoves are unnecessary." "I can cheerfully say, amen," the gentleman said, arising, "and I would like to include the pattern makers also, and, confidentially, the traveling salesmen—authors of all our woes—and I am thinking if our competitors were put in too, of course present company excepted" (bowing lowly)—"perhaps if we could get these and a few other things to go, which I will try and think of, we might make a few pennies. Of course I speak as a good Christian."

The chairman rebuked him, and said they didn't want any Christians in the business. The speaker apologized, and said he did not intend to include the chairman. However, he might think it would be to his interest. The orchestra then played the Monkey and the Parrot.

The next was "Clams." The clamist arose, and, opening his shell, he said:

"I have found by experience and long observation that the clam lives in the water, and not in the woods, as many of you gentlemen from the West might suppose. Clams, from their earliest history, have always been clams, and never oysters. This is where the clam has the best of man, because he was once a monkey. There is another use to which clams might be put besides their present occupation. We could name our stoves after them. We are always seeking appropriate names, and here is a new field. We have knocked spots out of the acorns; now let us try clams. "The Clam," "The Clam Improved," "The New Clam," "Old Clam," "Boston Clam," "New York Clam," "Royal Clam," &c. (Here some one said he would "clam all over the speaker if he didn't sit down." He shut up his shell.)

The company now became very sociable, and there were lions and lambs playing like kittens. You would have thought they had always dwelt in brotherly love and affection all their lives. May they continue so. The smokables were immense. Every fellow had two; me, too. The next toast was:

"*The Metal Worker:* May some one invent a damper to check its drafts." Some one said, "The stove men are always willing to check its drafts themselves." Of course the Editor had to respond. As I had never seen him, I was quite curious; so I squared myself on my numerous chairs, and getting a good light on my two base burners, I prepared to listen to a disquisition on the art of cutting a skew-eyed dipper pattern, or how a man died because he drank his sewer water without filtering it. But nothing of the sort. When he started to get up I thought he never would stop. He wears a moustache waxed out and an imperial like the late Mr. Napoleon. He kept getting up, growing taller and taller; then his moustache kept pointing up to his eyes; then the corners of his eyes got going up in the same direction, and as he grew he became more attenuated, and when he opened his mouth it looked like a big slit. Suddenly he struck a position. "Mephistophiles! by the hookey!" I mentally exclaimed. I was transfixed at the apparition. He related a terrible tale of a party by the name of Dante, who kept an inferno for the making of stoves, who, having made three or four fortunes, wanted another for some purpose. So, assembling together his infernals, as he called his men, he announced his intentions, saying that he did not wish to deprive them of work, but as times were so hard and he needed the money so much, he would run the shop this year full if they would work without pay, and promised them a job the next year if he succeeded. He told them the reservoirs were filled with water and the air was free, and asked, "And now, men, will you work for me?" And they fairly howled, "We will! we will! and aye, we'll die for you." Then Dante entered his humble office, all decorated with mirrors, fine furniture, carpets, &c., and concocted a plan to bamboozle the trade with all his old patterns "befrilled." And you ought to have heard the Editor spread himself on the theme. Dante succeeded to his heart's content; at the end of the year he had raked his pile and had ordered the bar'ls to put it in. Going into the inferno to announce his good luck and to give the boys the same chance the next year, he found all hands stiff, stark dead at their posts—literally starved to death. Dante adjusted his eye-glass and "sweetly smiled," took in the scene, scratched his head and exclaimed: "Ungrateful wretches! After all I have done for you, is this my reward?" Then, pulling down his vest, he walked out, locked the shop, and congratulated himself that he could cut the flux item out of the expense account the next year, as he would use the infernals' corpses instead. When the Editor finished this fearful poetry his head reached the ceiling. Suddenly he telescoped downward, and his sharp beard reached the table, holding his head up as if on a spike. Then his head grew enormously like a gnome. Then, much to my horror, all the rest of the heads around the table did likewise, and their eyes rolled and their mouths grinned like ogres. I was frightened; I was sick. Every peanut was scared, and how they did scrabble to escape. But a little cracked ice on toast settled them; but they had to open the window, as the air got very fixed. No one has heard of the Editor since. He was last seen chasing the "L" down Sixth avenue.

There were more toasts, but my memory is so poor that I cannot remember them, and I should dislike very much to repeat anything that was not said.

A gentleman had a very narrow escape from losing his life during the evening; that it did not so happen is due to the presence of mind of Mr. Delmonico, the landlord of the tavern. A song was called for. The gentleman who was to sing it, after clearing his vocal organs in the usual style, and positioning himself in the most classical manner, in order to give due effect to the ballad, he commenced, and had hardly got as far as "I am the Captain of the P——" when the huge mirror over the mantel was seen to lean forward. The eagle eye of Mr. Delmonico, who was passing the door with a long-handle brush on his way to one of the boarder's rooms to brush a cobweb off the corner of the ceiling which the boarder had complained of in the morning, saw the impending catastrophe, knew the man would be killed and the mirror, destroyed. Anxious to save the mirror, he darted with the rapidity of lightning, and held the top of it with his brush. The guests were paralyzed when they saw the danger, and the unconscious singer smiled in happy ignorance of his impending fate. Some of the gentlemanly plate waltzers rushed to the assistance of the landlord, and the glass was secured. The singist's nerves were so unstrung when he became aware of the danger, that he swallowed a bottle of wine at a gulp. The landlord said that all such "high art" music was dangerous, and forbid any more of it, as the furniture would not stand it; but in order that the guests should not be disappointed, the chairman said he had the pleasure last season of visiting the birth-place of one of our most distinguished composers, and there was a gentleman in the room who would favor us with one of his classical airs. The gentleman arose, and in the precise manner of his predecessor, prepared himself and sang the beautiful air from Schuman's serenade, entitled, "*Non sai tu che l'anima,*" which, freely translated, is "Skipping the Tra-la-la-lee." As most all the guests were familiar with classical music, the chorus was quite effective. We were informed this was the last song Michael Schuman composed. He breathed his last at the end of it.

The cooking was so good that I was mighty anxious to know what the things were. They had them printed on a red satin card, with plush linings on it, and a great big ten dollars—the biggest ten dollars I ever saw in my life—embossed on them. But as the items were in French, a gentleman, whom I afterwards learned was from Detroit, very kindly translated it for me. He was splendid. He spoke French like a Dutchman.

"Now," says I, "I would just like to know what all the things are we have put in, just so as I can tell the old lady when I get home."

"Well, now, bub," says the Detroiter, "the first thing on the keerd is '*Menee;*' that's me and you."

"All right," says I, and I "howd."

"No, no, you don't 'how' now; that is only on the keerd."

"Well, then, fire away, pardner," says I, and I was cutting a big swath, two cigars, double illuminators, one in each hand, braced up all around on five chairs, just like the boss does when he don't want a drummer to get a seat. I don't suppose John Brown put on half as many airs when he was hung as I did on that historical evening.

"There is '*Huitres;*' that's stove covers on the half-shell. '*Potage*' is various kinds of pots, kettles, &c. Then the '*Hors d'œuvre*' is oven plates fricasseed, and such, you know," getting an extra hitch on his glasses; "and then, let me see. '*Releves,*' *Bass aux crevettes,*' is drafts returned, with Yuba Dam sauce. '*Entrees;*' that's customers stuffed with high prices, and red-hot drummer with fat salary. '*Sorbet*' is 'rye and rock.'" The next was "Red-headed ducks" in plain letters. When we come to that, if all the old parties didn't know more about red-headed ducks than enough; but the Detroit gentleman beat them all and carried off the palm. I forgot to say the duck was not the kind of a duck that Mr. Delmonico furnishes, exactly, but the kind of a duck that runs wild; at least, that's the way I understood it. Then they all put in a little interpolation, but not me. "'*Entremets*' them is tin-lined sandwiches, with polished edges. '*Petits Pois*' is patent suits with sugared royalties," and "'*Flageolets,*' said a Buffalo gentleman, "is narrow gauge railroads with two per cent. sauce, served monthly." His road was too narrow; he went under the table. "'*Sucres*' must be suckers" my friend guessed, and "'*Pouding aux fruits,*' that's mica pie, anti-clinker sauce," said a Philadelphia gentleman who had studied French two days. Then there was lots of other things, such as cold roast pig iron, hot ice cream, ice cream on a wire, &c. And "tiffey!" I never saw so much "tiffey" panned out on one go before. It run all over every one.

Tiffey was a stove man. The hour was waxing late, and it wanted but a few minutes of nine; everybody was anxious to get home. So a motion was made, and the man was carried out to adjourn.

The finale of this thing was grand. The guests were all requested to rise and sing—hang me! if I can remember the tune, but it seemed to me that I had heard it before. Singular to relate, the table got up, then the chairs, then the convention people revolved around the table—that is, as well as they could, as the table had to get a chance. They chanted the beautiful hymn that I can't remember the name of, and the candles blazed, and the mirrors smiled, and—I give it up! It is impossible for me to describe the last, but ambulances, stretchers, shutters, &c., were in plenty, so that all were attended to. The last thing I saw was one of the guests putting a couple of plug hats on his feet for goloshes, and afterward put a golosh on his head and pulling the flaps of it over his ears he was gently shuttered to the hotel. The next morning all the members had new hats—old ones wouldn't fit—except me. I had only a bandana; had to wait till I could shrink into the "parade," which has graced some nine-and-thirty processions. The banqueters were not exactly like the ladies who wear banged hair, but they had banged heads all the same, you know. Be it ever so humble, there is no place like Delmonico's.

JEEMS.

Spriggins visits his friend Pennyshaver, and finds him perched at the top of a ladder, while a small fire is burning in the stove.

"What are you doing up there?" says Spriggins.

"Well, you know that heat ascends," answers Pennyshaver, "and so I save a good deal of wood."

A proposal has been made to build new water works for Hochelaga, Quebec.

Office of THE METAL WORKER,
SATURDAY MORNING, February 21, 1880.

Antimony.—By virtue of its scarcity the metal remains firm, with an improving tendency, and we quote Cookson 23½¢; other brands in proportion.

Copper.—The market has been very quiet, sales not exceeding 100,000 pounds Lake Superior, at 24¢ @ 24⅛¢, the outside figure being asked at the close. Baltimore may nominally be quoted about as much. There has been no change in the manufactures of Copper here since our last report. We quote: Braziers' Copper, 34¢; Bolts, 34¢; Circles, 37¢, and Sheathing Copper, 32¢.

Hardware.—The volume of business continues large, and manufacturers of nearly all classes of Hardware are behind on their orders. The tone of the market is more settled than it has been of late.

The Enterprise Mfg. Co. of Pa. and the American Machine Co. of Philadelphia, have issued a joint circular under date of 17th inst., in which they say: "The patent of Mrs. Potts, May 24, 1876, has been re-issued to us January 6, 1880, and suit has been commenced against infringers of this patent, and also of Mrs. Potts' re-issued patent of October 7, 1879. Manufacturers of and dealers in sad-irons are hereby informed that further and prompt legal proceedings will be taken against all who make and sell sad-irons which infringe either of the said re-issued patents."

We have received the following circular:

LACONIA, N. H., Feb. 10, 1880.

GENTLEMEN: Our dry house was burned yesterday, and as various reports will circulate through the daily papers, we take this method of informing you that the fire will not interfere with our Freezer business, as we have a large stock of manufactured Freezers and Freezer Pails on hand in our storehouses, and can fill all orders promptly.

Yours respectfully,
WHITE MOUNTAIN FREEZER CO.
Thos. Sands, Agent.

Iron.—It is not easy to define the present condition of the Iron market, but, so far as Pig Iron is concerned, it is in our estimation somewhat weaker than at our last writing. The high prices which are ruling make consumers pause before committing themselves to large transactions, and in consequence we do not hear of any more business than is necessary to tide over the present requirements of the trade. Such sales as have come to our notice have all been made on the basis of $40 for No. 1 at tide-water, but there are some makers who will not meet this price, and $40 at the furnace is a common quotation. We quote same as last week, viz.: Foundry No. 1, $40 @ $41; Foundry No. 2, $38 @ $39; Gray Forge, $37 @ $38. Notwithstanding the fact that cable report shows an advancing tendency in prices of Scotch Pig Iron on the other side of the water, and another very important fact, that freights have advanced to 22/6 from Glasgow for steam vessels and 17/6 for sailing vessels, the market here is weak, and there is more urgency to sell than the above-named conditions would seem to warrant. The arrivals of foreign Pig Iron at this port, for the week ending Feb. 17, amount to 9500 tons, a good deal of which has been stored. We hear of sales of 200 tons Gartsherrie, on private terms; 150 tons Eglinton, in lots, at $32.50 @ $33, and 300 tons Gartsherrie at $32.50. We quote Eglinton, $32; Coltness, $35; Glengarnock, $32, and Gartsherrie, $32 @ $33. We hear of a sale of 300 tons No. 1 Wrought, from yard, at $45, and quote the same $42 @ $45.

Lead.—The market is in a quiet mood and no sales of note have transpired. We quote Domestic, 6¼¢ @ 6½¢. "London, Jan. 31.—There is not much change in the position of this market, prices being quoted about the same as last week, and the demand keeps rather quiet, especially for shipments." Manufacturers' prices are unchanged. We quote: Bar, 6½¢; Pipe, 7¾¢; Sheet, 8½¢; Tin-lined Pipe, 15¢, all less 10 % to the trade.

Nails.—There has been a fair inquiry for Nails during the week, but prior to the meeting of the Atlantic States Nail Association, which took place in this city on Thursday last, holders were not anxious to enter larger orders than the legitimate requirements of consumers demanded, as it was generally believed that the card would be advanced. The price determined upon at the meeting was $5.40 for 10d to 60d, with an allowance of 10 cents per keg on orders of 200 kegs and over. At these figures the market is firm.

Nickel.—This metal remains in steady, moderate request at $1.40 ℔ lb for prime American.

Old Metals, Paper Stock, &c.—The Old Metal market is firm, and there is an improvement in the demand as a general thing, but we note no important change in prices. There is an active inquiry for all grades of Paper Stock.

The purchasing prices offered by dealers for Old Metals are as follows:

Copper, heavy	per lb.	$0.18	@	.20
Copper Bottoms	"	.16	@	.17½
Yellow Metal	℔ lb	.10	@	.11
Brass, heavy	"	.12	@	.13
Brass, light	"	.08½	@	.09½
Composition, heavy	"	.15	@	.16
Lead, heavy	"	.04¾	@	.05
Tea Lead	"	.04½	@	.04¾
Zinc	"	.03½	@	.04½
Pewter, No. 1	"	.12	@	.13
Pewter, No. 2	"	.07	@	.08
Wrought Iron	per ton	35.00	@	37.50
Light do	"	22.50	@	25.00
Stove Plate	"	15.00	@	17.00
Machinery do	"	22.50	@	25.00
Grate Bars	"	10.00	@	12.50

The prices current for Rags, &c., are as follows:

Canvas, Linen	per lb.	4½c.	@	c.
White Cotton, New	"	4½c.	@	....
" No. 2	"	3 c.	@	....
White, No. 1	"	5¾c.	@	....
No. 2	"	4 c.	@	....
Seconds	℔ lb.	2½c.	@	c.
Soft, Woolen	"	1¼ c.	@	....
Mixed Rags	"	2 c.	@	3 c.
Gunny bagging	"	4 c.	@	....
Jute butts	"	2¾c.	@	....
Kentucky bagging	"	2 c.	@	3 c.
Book Stock	℔ lb.	3 c.	@	....
Newspapers	"	2 c.	@	....
Waste Paper and Scraps	"	1 c.	@	....
Kentucky Bale Rope	"	4 c.	@	....

Spelter and Zinc.—A moderate demand at firm prices prevails. We quote at the close, Common Domestic, as well as Silesian, 6¾¢. *Sheet Zinc*, 8¼¢ @ 9¢.

Tin.—Our market has assumed a quiet tone; Banca, 28¢; Straits, 26¢, and English, 25¢. The demand for *Tin Plates* has fallen off, but prices are firm at the figures quoted last week. I. C. Charcoal, $10 @ $10.50; I. C. Coke, $9.50; Charcoal Terne, $9.25 @ $9.50, and Coke Terne, $8.75.

NEW CATALOGUE.

Messrs. Rumsey & Co., Seneca Falls, N. Y., have just issued a new and very handsome illustrated catalogue of their goods. It consists of 226 pages of cuts and reading matter, embracing lists of almost every description of hand and portable pumps, power, steam and windmill pumps, fire engines in great variety, and hydraulic machinery of various kinds, besides bells, hose-carriages, jack-screws and similar goods. In garden and small fire engines the list is very large, embracing all sorts of engines, from those which can be worked by a single man to those for village use, which require twenty or thirty. Hose carriages and reels and hook-and-ladder trucks are also made, as well as a great number of special goods of various kinds.

In this catalogue great care has been taken to have every article described and its peculiar advantages noted at length. As a new feature, the capacity per stroke of almost every pump cylinder in the whole list is given. This enables the purchaser to know just what the pump will do under the varying conditions which it is likely to meet in the work at which it is to be put. This feature we have never seen before in a pump catalogue. The illustrations, descriptions and price lists should enable the buyer to select exactly what is wanted, without any difficulty. Aside from being a new catalogue, it has an especial interest for all who use pumps. Both printing and engraving are good, and the catalogue does credit to the enterprise and experience of the firm. We shall take occasion to make extracts from this catalogue which, we think, will be of interest to our readers.

The latest attempt to solve the sewage problem has just been made by the construction on the Clyde, Scotland, of a sewage steamer called the Alpha. It was designed and built by Messrs. Simon & Coy, of Renfrew, to the order of the corporation of Liverpool, for the purpose of conveying the sewage of that city far out to sea. In its construction, the well is wider at the bottom than at the top, and instead of being one oblong tank, it is divided into ten compartments. These are separated by perpendicular partitions, so that the contents may fall readily into the water. The doors are worked on a novel principle. Along the center is a set of gearing, by which the doors are opened and shut; they are kept open by strong iron bars until the load has fallen. A patent pulsometer pump of large dimensions is fitted in the stoke hole, with a discharge pipe on deck, designed to force out any light substance which may have clung to the sides. Externally, the vessel resembles an ordinary steamer. The hull and deck are built of iron, but the hopper cavities are of steel. It is expected to carry a dead weight of 350 tons, at a speed of nine knots an hour. It will immediately be used to transport the refuse from the streets, but if the experiment prove successful, the system will be applied to liquid and solid sewage, and vessels with a capacity of 1000 tons may be built.

The firm of Randall & Baker, stove and hollow-ware founders, of Cincinnati, have been succeeded by Randall & Stransky. The new firm, while continuing the manufacture of stoves and hollow-ware, propose to increase their business in tin-plates, sheet iron, copper, solder, and all goods used in the tin shop, stamped ware, plain and japanned ware, &c. The stove and hollow-ware department is under the direction of Mr. T. G. Randall, while Mr. Maurice Stransky has charge of the other lines of goods. The firm will manufacture a number of specialties.

PROJECTED BUILDINGS.

New York.

NOTE.—In these lists "o." stands for owner, "b." for builder, "a." for architect, and "c." for carpenter.

Plan 118—N. s. 71st st., 120 ft. e. Lexington av., 1 first-class brown-stone dwelling, 20x50, 3 stories, tin roof and iron cornice; o. and b., John Davidson; a., James E. Ware; cost, $11,000.

Plan 119—Church st., w. s., 1000 ft. s. Broadway, 2 frame dwellings, 19x28, 2 stories; o., Albert E. Putnam; a. and b., Samuel L. Berrian.

Plan 120—Varien av., 100 ft. s. Depot st., 1 frame dwelling, 19x28, 2 stories and ext'n; o., a. and b., James H. Goodwin; cost, $1200.

Plan 121—Varien av., w. s., 100 ft. s. Post Road, 1 frame dwelling, 22x32, 2 stories; o., a. and b., James H. Goodwin; cost, $1200.

Plan 122—67 S. 5th av., 1 carriage room and stable, 25x95, 3 stories and basement, gravel roof and iron cornice; o., C. L. Wolfe, 3 Mercer st.; a., J. B. Snook, 12 Chambers st.; c., W. C. Miller, 145 S. 5th av.; cost, $8000.

Plan 123—S. s. 47th st., 50 ft. w. Broadway, 1 brick furnitnre warehouse, 34x92, 5 stories, tin roof and iron cornice; o., Chas. Johnson, 287 9th av.; a., D. & J. Jardine, 1267 Broadway; b., N. & H. Andrus, 444 West st.; c., E. H. Miller, 6 Gansevoort st.; cost, $14,000.

Plan 124—448 West st., 1 brick stable, 25x30, 2 stories, gravel roof; o., John Leonard, 451 West st.; b., M. Reid, 228 W. 10th st.; cost, $1200.

Plan 125—S. s. 53d st., beginning 200 ft. e. 5th av., 1 first-class brown-stone dwelling, 25x60, 4 stories and basement, tin roof and iron cornices, hot-air furnaces; o., John C. Donnolly, 557 Lexington av.; a., Jas. E. Ware, 697 Broadway; cost, $25,000.

Plan 126—S. s. 108th st., commencing at s. e. cor. 4th av., 10 brick and brown-stone trimmed ten't, houses, 25½x52, 4 stories, tin roof and iron cornices; o., E. M. Meehan, 131 E. 109th st.; a., A. Spence, 3d av. and 102d st.; cost, $9500 each.

Plan 127—S. e. cor. Lexington av. and 111th st., 3 first-class brown-stone dwellings, 16.8x50, 3 stories and basements, tin roofs and iron cornice, hot-air furnaces; o., Thos. F. Tracy, 135th st. and 6th av.; a., Chas. W. Romeyn, 1514 Broadway; b., James Frame; c., Samuel O. Wright.

Plan 128—S. s. 143d st., 100 ft. w. 3d av., Mott Haven, 1 frame store and dwelling, 25x40, 2 stories, tin roof and wood cornice; o., Louis Lunies; b., J. Knox, 135th st. and Lincoln av.; cost, $2000.

Plan 129—805 4th av., 1 brown-stone flats, 25x58, 4 stories, tin roof and iron cornice; o., B. Haberstroh, 53d st., near 4th av.; a., Wm. Josie, Bible House; cost, $10,500.

Plan 130—S. s. 66th st., 105 ft. e. 4th av., 1 brick stable and dwelling, 25x100, 2 stories, tin roof and stone coping; o., Alex. H. Stevens, Gallitin Bank, N. Y.; a., G. E. Harney, 149 Broadway; b., J. J. Tucker, 37 W. 12th st.; c., Bartlet Smith; cost, $7300.

Plan 131—8th av., 50 ft. n. 125th st., e. s., 2 stories, 25x30, 1 story, gravel roof; o., Alva S. W. Walker, 43 W. 132d st.; a., Thos. E. Thomson, Tremont Station; cost, $1500.

Plan 132—S. s. 106th st., 150 ft. e. 1st av., 1 brick brass foundry, 60x95, 3 stories and basement, tin roof, brick and iron cornice; o., Nathan & Dreyfus, s. w. cor. New Church and Liberty sts.; a and c., F. Ridder; cost, $15,000.

Plan 133—1 and 3 King st., 2 brown-stone flats, 17½x65, 5 stories, tin roofs and iron cornices; o. and b., E. Cunningham; a., Thom & Wilson.

Plan 134—N. s. 120th st., 80 ft. e. 2d av., 1 first-class brown stone dwelling, 15.2x50, 3 stories and basement, tin roof and iron cornice; o., J. McSorley; a., J. H. Valentine, 3d av; cost, $6000.

ALTERATIONS.

Plan 120—143 W. 129th st., to build frame ext'n, 6x11, 1 story, tin roof; o., Edward Ketchum, 2494 2d av.

Plan 121—390 Pearl st., to repair damage by fire and restore building to its former condition; o., Lockwood & Crosby; b., Henry Wallace, 3 Center st.

Plan 122—N. w. cor. Pine st. and William, to take out front of 1st story and put in rolled iron beams and new store front; o., W. T. Manus, on premises; a., J. D. Miner.

Plan 123—9th av., cor. Little 12th st., to take out wood pillar and replace it with iron column; o., M. C. Moloney, on premises; b., John Scherver, 631 E. 5th st.

Plan 124—83 Fulton st., to take out pier in 1st story and put in iron T-beam; also rebuild side wall; o., C. J. Pryer, 52 W. 27th st.; c., J. Miller, 45 Gold st.

Plan 127—46 W. 14th st., to add 1 story on brick ext'n, tin roof; o., Chas. Eaton, on premises.

Plan 129—154 and 156 W. 19th st., to repair damage by fire, and restore buildings to their former condition; o., G. C. Flint, 104 W. 14th st.; b., Henry Wallace, 38 Center st.

Plan 130—34 and 36 Elizabeth st., to build brick extension, 25x70, 5 stories, tin roofs; o., John S. Giles, 174 Canal st.; a., J. W. Ritch, 58 Ann st.

Plan 131—18 E. 46th st., to build brick ext'n, 5½x11½, 2 stories, tin roof; o., H. B. Turner, on premises; c., Jas. H. Studley, 227 32d st.

Plan 132—N. s. 161st st., 125 ft. w. 10th av., to add 1 story on frame dwelling, and substitute flat tin roofs for peaks; also make internal alterations; o., Mrs. M. Robertson, 161st st. and 10th av.; a., C. Baxter, 2260 3d av.

Plan 133—121 W. 28th st., to build brick ext'n, 9x28, 4 stories, tin roof and iron gutters; o., E. Bergamiese, on premises; b., Thomas Smith, 1704 1st av.

Plan 134—86 Gansevoort st., to build brick ext'n, 20x20, 1 story, tin roof; also make internal alterations and put in new store front; o., H. P. Archer, 14 W. 52d st.; b., Milton Roof.

Plan 135—540 9th av., to take out brick piers in rear basement and rebuild the same, also make internal alterations; o., Frederick Helbig, 526 9th av.; b., M. Lapp, W. 51st st.

Plan 136—151 South st., cor. Peck Slip, granite post on corner to be removed and iron girder and column, with new show windows, put in; o., Peter W. Hoeft, on premises.

Plan 137—239 S. 5th av., to build brick ext'n, 19x40, 1 story, gravel roof; o., J. Watson Webb.

Plan 138—E. s. 3d av., 100 ft. s. 169th st., to add ½ story on brick brewery, tin roof; also build brick ext'n, 31x53, 3 stories, tin roof and iron cornice; o., John Eichler, on premises; a., Anthony Phund, 232 W. 36th st.

Plan 139—S. e. cor. 9th av. and 42d st., to build brick ext'n, 16x20, 1 story, tin roof and iron cornice; o., John Male, on premises; a., W. H. Canvet.

Plan 140—625 8th av., to take out front and put in iron columns and new show windows; also lower floor of first story; o., C. W. Doherty, 211 W. 46th st.; c., J. Washburn, 313 W. 40th st.

Plan 141—137 Av. C, to build brick ext'n, 20x17, 2 stories, tin roof and iron gutter; o., Morris Osterweis; c., Guy Culgin, 703 6th st.

Plan 142—56 Hudson st., to put in iron girders and columns and new show window; o., A. R. Whitney, 58 Hudson st.

Plan 143—184, 186 and 188 Reade st., to take out part of 4th story beams, leaving 8 ft. to form gallery, same as in No. 182; o., E. R. R. Co., Erie Building.

Plan 144—128 Water st., to raise the walls of ext'n, 10 ft.; also, raise iron rod girder; O., Mr. Spitzenberger; a., Chas. Sturtzkober, 266 E. 41st st.

Plan 145—101 Prince st., to remove pier in basement and 1st story, and put in iron girder and new piers on each side of opening; o., Sarah Hall, Rockaway; a., Michael Dooley, 57 W. Houston st.

Plan 146—220 W. 29th st., to take out front of 1st story and support upper walls on iron girder; o., Bartlet Smith, 220 W. 29th st.

Plan 147—544 W. 29th st., to build brick ext'n, 19x21, 1 story, tin roof; also put in iron girder in rear wall of front building; o., Martin Kalb, on premises; b., Patterson & Co.

Plan 148—282 E. Houston st., to build brick ext'n, 24x28 and 34, 2 stories, tin roof; o., B. Ochs, on premises; a., Frederick Jeuth, 191 Forsyth st.; b., Frank Merck, 193 Rivington st.

Plan 149—6th av., s. w. cor. 17th st., the westerly wall, 22 ft. long, to be taken out and 2 rolled iron beams and columns put in; o., John Beir, 2d av.; a., Julius Boerkill.

Plan 154—84 Gansevoort st., to build brick ext'n, 27x6, 1 story, tin roof, also make internal alterations in front building; o., J. H. Rhode, on premises; a., C. F. Ridder, 672 8th av.

Plan 160—744 6th av., to build brick ext'n, 20x12, 1 story, tin roof, also put rolled iron girder in rear wall of main building; o., John G. Cary, on premises; b., John Grey, 194 W. 54th st.

Plan 162—W. s. Corlear st., 55 ft. n. Cherry st., to put in new tier of beams, in present car shop, to make harness workshop; o., E. B. and Battery R. R. Co., 604 Grand st.

Plan 163—N. w. cor. 53d st. and 4th av., to cut two openings in parlor for bay windows, and put in iron girders over same; o., R. McCafferty, 705 Madison av.

Brooklyn.

Plan 77—961 St. Marks av., near Troy av., 1 frame dwelling, 16x18, 1 story, tin roof; o., John Morrow, on premises; b., W. L. Ryerson.

Plan 78—1293 Myrtle av., 1 frame stable, 14x16, 1 story, gravel roof; o., M. Reise, 1297 Myrtle av.

Plan 79—Bushwick av., cor. Adams st., 1 frame dwelling, 25x30, 2 stories, tin roof; o., J. Davis, 445 Evergreen av.; c., Robert Wright, 442 Central av.

Plan 80—N. w. cor. Classon and Gates avs., 1 brick store, 34x23, 1 story, gravel roof; o., J. Hink, 269 Clermont av.; b., M. McKnight, Vanderbilt and De Kalb avs.

Plan 81—255 6th av., 1 brick stable, 16x22, 1 story, gravel roof; o., W. B. Scovie, on premises; c., Joseph Simms.

Plan 82—W. s. 3d av., 75 ft. s. 40th st., 1 frame dwelling, 25x25, 1 story, gravel roof; o., Michael Fayer, 1056 7th av.; c., Chas. Thompson, 38th st.

Plan 83—E. s. Howard av., 40 ft. n. from Hancock st., 1 frame dwelling, 15x30, 2 stories, gravel roof; o., M. Muladay.

Plan 84—N. s. Ellery st., 100 ft. w. Tompkins av., 1 frame dwelling, 22x40, 2 stories, tin roof; o., Adam Berkardt, on premises; c., John H. Eich, 259 Ellery st.

ALTERATIONS.

Plan 64—133 N. 6th st., to build frame ext'n, 22x15, 3 stories; o., F. McNamee, on premises; b., P. Clarke, 62 N. 2d st.

Plan 65—490 and 492 Fulton st., to build brick ext'n, 16x12, 1 story, tin roof; o., James Burns, cor. Green and Classon avs.; b., James Fenton, DeKalb av.

Plan 66—80 Cambridge place, to build brick ext'n, 13x22, 3 stories, tin roof; o., John H. McCauley, on premises; c., Andrew Wilson, 496 Bergen st.

Plan 67—157 Dean st., to repair damages by fire and restore building to its former condition; o., William Vanta, 692 Willoughby av.; b., Jas. Brady, 113 Nassau st., New York.

Plan 68—N. w. cor. Bedford av. and Ross st., to build brick ext'n, 50x51, 1 story and basement, mansard roof, tin and glass; o., Joseph L. Knapp, on premises; a., Arthur Crooks; b., John H. Rourke, 151 Douglass st; c., James Thompson, Staten Island; cost, $15,000.

Plan 69—795 4th av., to build frame ext'n, 8x15, 1 story, gravel roof; o., A. Hackman, on premises; c., Wm. Small, 28th st., near 4th av.

Plan 71—279 Washington av., to take out front of 1st story and put in iron girder and new store front; o., Mrs. Foly, on premises; c., Robt. White, 250 State st.

Plan 72—S. s. Dwight st., s. w. cor. Columbia st., to shore up front walls and build piers to correspond with second story; o., J. W. Mason, 140 Hicks st.; b., J. Allan, 76 John st.

Plan 73—72 Van Dyke st., to raise frame dwelling 6 ft. and build 13 brick piers under same, 12x16; o., Bernard Rorke, on premises.

Plan 74—83 Wolcott st., to raise walls of fourth story and substitute flat gravel roof for present peak; o., Robt. Kent, on premises; c., Gleeson & Son, 69 Partition st.

Plan 75—121 State st., to raise roof of brick dwelling 2½ ft., so as to make full story; o., Mrs. Hartung, on premises; b., P. Conway, 89 Pacific st.

MECHANICS' LIENS.

Brooklyn.

Feb. 12—N. s. Union st., 176 ft. e. Columbia st., thence e. 61x100, Nos. 141, 143 and 145 Union st.; Chas. Long agt. Arthur Brown, debtor and owner—claim, $6300.

Feb. 14—S. s. Hayward st., 183 ft. e. Lee av., thence e. 90x100; Francis F. Budd agt. John Davis, Christian Zanger and Marcus Videtts, owners and debtors—claim, $890.

Feb. 14—Same last-described premises; Watson & Pottinger agt. the same—claim, $51.

Feb. 13—S. s. Myrtle av., 48 ft. w. Palmetto st., thence w. 44x100; Chas. A. Wagner agt. Miller and John Finken, debtors, and John Finken, owner—claim, $185.50.

Feb. 16—E. s. Hall st., 584 n. Myrtle av., No. 83, 20x100; Jos. C. Metcalfe agt. Mary E. Holland, owner and debtor—claim, $25.

Feb. 17—Same last described property; Jos. C. Metcalfe agt. Mary E. Holland—claim, $25.

Feb. 14—S. e. cor. 16th st. and Jackson place, 44 ft. on 16th st. x100; H. S. Christian agt. John Buchanan and John McAuley, debtors, and Abigail A. Martliny and J. C. Simonson, owners—claim, $812.49.

Feb. 14—S. w. cor. Grove st. and Cypress av., thence w. 25x100 ft.; Watson & Pettinger agt. Mathew Smith and Jacob Bisson, debtors, and J. H. Shultz, owner—claim, $50.

Feb. 17—S. s. Rutledge st., 150 ft. e. Harrison av., thence e. 66x100; James J. Healy and Jacob F. Healy agt. Mathew Smith and Jacob Bisson, debtors, and John H. Shultz, owner—claim, $119.72.

London gas stocks have recovered from the decline caused by the announcement that Edison had perfected the electric lamp. It is reported that a new and remarkable French invention for the production of electric light will soon be made public.

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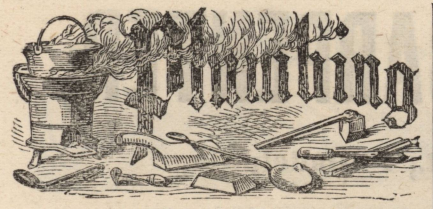


Venting an Adee Trap.

From SUBSCRIBER.—Is it necessary to run an independent pipe from the Adee trap to prevent it from being syphoned?

Answer.—Even if there is no vent-pipe trap, it is extremely difficult to syphon out an Adee trap, or to take water enough out of it to destroy the seal. As pipes and traps are commonly arranged, we do not suppose that it is ever done, except under the most peculiar circumstances. While the vent pipe may not be necessary to keep the trap from losing its seal, it is certain that all traps should have ventilating pipes to carry off the gases that may accumulate on the lower side of the water, and at the same time to keep up a free circulation through the pipes. Ventilation of all portions of soil and waste pipes is essential for safety to health. There are situations in which an unventilated trap may produce just as bad results, and may send as much sewer gas into a house as though the pipe were open and without a trap. This often happens in a line of pipe where there are two traps, one below the other. In such a case, when water is poured into the pipe, as much air must escape from between the traps as is equal to the quantity of water entering. Very frequently, if not always, the air passes up as the water goes down. Without ventilation the upper trap is, of course, useless, and the pipe would be better off without it.

Emptying Cesspools.

From SUBSCRIBER.—What is the best disposition to make of the contents of a cesspool when it is desirable to empty it?

Answer.—Our correspondent fails to give the name of the town and State in which he resides, and hence we are unable to answer his query with as much directness as might be desirable. In cities of any considerable size there are usually scavengers or night-soil men who are accustomed to such work, and who will take the contents of a cesspool away and dispose of it according to the sanitary laws of the place. If there are no regulations governing such work, and one has to depend upon the conveniences at hand, the matter becomes quite difficult, especially in a good-sized town. The best way, where there is room for the operation, is to take the contents out and put it into a shallow trench, say a foot deep, the size depending upon the quantity of matter and whether it is in a very liquid condition. If it will bear to be piled up, so much the better. Fresh dirt is thrown upon it to absorb the water, and the whole is treated very much after the manner of an ordinary compost heap; the main object being to get the whole mass mixed up with a sufficient amount of fresh dirt to make it harmless, and at the same time form a compost which shall be of some value upon the land. This plan may be employed in a large garden, but if the amount of land at hand is small and near dwellings, this plan will not work, because a nuisance would be at once created, or at least would be very likely to be, except in cold weather. Almost any farmer or market gardener would be glad to have the contents of a cesspool, if he could have it dumped upon his land free of cost to himself. The emptying may be done, when much water is used, by means of a pump and tight barrels. In many of our cities "odorless excavating companies" make a business of emptying vaults, privies, cesspools, &c., by means of air-tight tanks, pipes and pumps, which are so nicely made that the work of removing night-soil can go on in the day time without any unpleasant odors. The final disposition which they make of the night-soil is to convert it into a manure or fertilizer. A compost made in the way we have described is very valuable; yet it should not be applied in too large quantities, because it may, from its highly stimulating qualities, produce rank and unwholesome plants.

Mending Cracks in Cast Iron—Making Joints in Cast Iron Pipe and Joining Lead to Cast Iron.

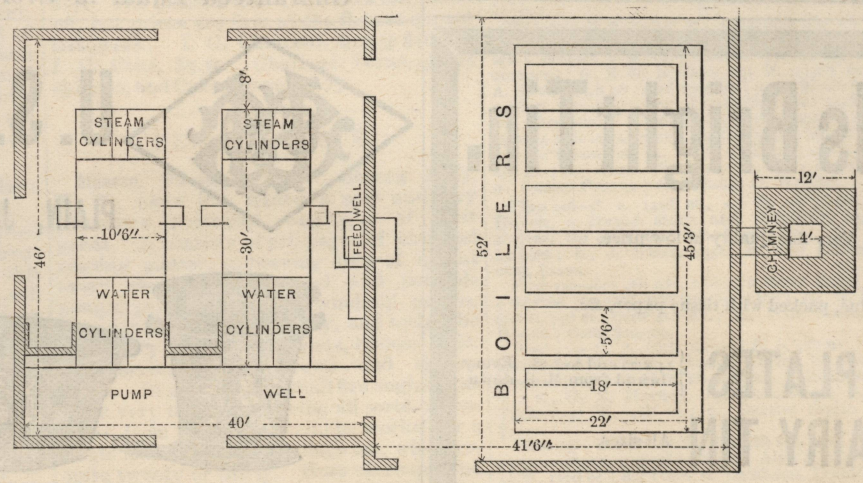
From SUBSCRIBER.—Can I repair a cast-iron water-back that has cracked by rusting the edges of the crack? If I can, will you tell me how a rust joint is to be made? How is a rust joint to be made on a cast-iron pipe? In joining lead with iron pipe and using a short piece of iron pipe as a ferrule, is there not danger of sewer gas following the outside of the lead and so escaping into the room? In putting in cast-iron pipe when joints cannot be got at to calk, is there anything that could be used in the line of lead (except, of course, an expanding alloy)? Could a good job be made by partly filling with lead and then finishing with a cement of some description?

Answer.—A cracked water-back seems hardly worth mending, unless it would be necessary to send a long distance in order to obtain a new one.

Cracks in cast iron may be stopped, however, by rusting them together when they are so situated that the metal will bear the strain thrown on it by closing it in this way. Rusting a crack, or making a rust joint, is practically only a method of calking. The rust, or oxide of iron, occupies more room than the iron from which it is formed, and by its formation in a crack or joint we may easily close the place entirely. The best way of making such a joint is to mix the iron filings with water and pack them into the joint. The usual rules call for the use of salammoniac and sulphur, but these are not needed, and only complicate matters, making a nasty mess, which corrodes the iron to a much greater extent than is needed. If the crack in the water-back is not opened sufficiently to allow the introduction of iron filings, salammoniac may be put into it with the hope of rusting the edges till the crack is closed. This will, of course, tend to make the crack larger, and if the metal is not strong enough to withstand this the crack will be extended. If the crack be large enough to allow iron filings to be packed into it, and at the same time the casting can be strapped so that no further cracking need be feared from the wedging effect of the rust joint, the operation of closing the crack will be quite simple and precisely like that of making a rust joint in a pipe. To put cast-iron pipes together with a rust joint they are set up in the usual way, and the filings, which are wet with water, packed into the hub around the spigot end of the upper pipe. All the directions given in the books for making joints of this kind recommend various chemicals to be mixed with the filings, but the water is all that is needed, and by its use alone a good joint may be made.

The use of an iron ferrule for connecting lead and iron pipes is not to be recommended under any circumstances. The ferrule should be tinned and the lead soldered to it. A good calked joint can then be made, and the work will be tight. With a brass ferrule it is easy to get a good tinned surface, and equally easy to solder the lead fast to it. On the other hand, if iron is used the job is much more difficult, and the solder will be almost certain to leave the iron.

How to make a joint in a cast-iron pipe when there is not room for calking is rather a difficult problem, and yet we are inclined to think that the lead joint, calked, is the only one that should be used. It sometimes happens that several lengths may be put together before they are slipped into place and so the difficulty "dodged." At other times bent calking tools will answer to get into places where the ordinary tool will not reach. In a very shallow niche, one side of a joint may be calked and then the pipe turned about so as to bring the back side to the front. A lead joint is of no value unless it can be calked, because of its tendency to shrink upon cooling and leave a space between itself and the iron. There are no cements which it would be safe to trust for the purpose. A rust joint would probably answer as well as anything, but it has the disadvantage of requiring to be packed tightly in its place. We think that by taking hold of the other end of the problem—that is, contriving means for getting a lead joint into a given place—our correspondent may escape from the difficulty he suggests. It often occurs, in the plumber's work, that much more ingenuity is needed to find ways and means for getting at a given job than in actually doing the work.



Buildings for Water Works.—Plan of Engine and Boiler Houses.

Buildings and Engine Foundations for Water Works.

The question of what system of water works shall be adopted is one which is of especial importance in small towns, where the people can ill afford to expend a single dollar uselessly. In the matter of comparing the merits of different systems, town committees, very unfortunately, have little or nothing to guide them in reaching a conclusion. One of the first points which an engineer looks after is the cost of the foundations for engines, boilers, &c. No comparison of cost between rival engines can be considered complete that does not involve the cost of the peculiar buildings and foundations required by each variety. It would not be difficult to exhibit cases where the expense of foundations alone were nearly, if not quite, equal to the contract price of the engine.

In considering the question of the extent and massiveness of mason work required, it will be noticed as a valuable peculiarity of the direct-acting steam pumps, whether intended to work high or low pressure, that their power is nearly all exerted in a direct line, with little or no tendency to make oblique pressure in any direction.

Their working efforts are contained within the frame which tie their parts together, and scarcely tax the bed upon which they are laid, except to support the weight. But for the thrust produced by the water in the delivering main, a holding-down bolt would hardly be required. In fact, such engines have often been temporarily run without being fastened in any way.

In slight qualification of these remarks, it will be observed that, in cases where air pumps are driven from the main cross-head by a bell crank or by links through a lever, the motion of the air pumps is indirect; but the power expended upon them is not enough in amount to make sensible difference, and practically the whole force of the engine is expended directly in line with the connecting bars. The only tendency to disturbance that needs to be guarded against arises either from the settlement or compression of the mason work, the lateral thrust of the forcing main, before adverted to, or the expansion of the engine when heating up, all of which is easily met.

It may be said, in general terms, that a block of masonry 8 feet deep, built upon reliable ground, is sufficient for the foundation of the largest of this style of engine yet erected. In general this block of masonry is built of about the same length and width as the steam cylinders. If the air pump and condenser are set below the engine and the former is driven from the main piston rods, the center of the block will be largely cut away. When an independent condenser and air pump are used, as is common in all the smaller engines, the block of masonry is solid. The upper side is about one foot above the level of the engine-room floor, and the holding-down bolts pierce the block from top to bottom.

Brick laid in cement is the material generally selected, as being easy to procure and more readily laid to exact dimensions, with suitable pockets for the foundation bolts. But stone is often, and in some cases advantageously, substituted.

These foundations are so simple in shape as to be readily built by any good mason, and so compact and low down as to make it easy to place the heavy parts of the engine upon them. It is not possible to make an accurate statement of cost except for specified localities, on account of large local differences in the prices of labor and material. But $2000 may be taken as the outside cost of foundations for an engine not exceeding 6,000,000 gallons per day capacity. This is a quantity of water two-thirds larger than is needed by a city as large as Rochester, N. Y.

As regards the buildings required, it is plain to see that an engine of the kind described, resting upon mason work at the level of the floor, does not tax the engine-house for support of any kind. It only requires protection, combined with enough attention to architecture, to meet the requirements of good taste and permanent construction. But for these and the danger of fire, the simple wooden building under which several of the largest of these engines have been called upon to labor until permanent structures could be provided, would have answered indefinitely.

The air chamber, which is the only elevated appendage to the engine, never reaches so high as to demand a loftier roof than is indicated by architectural propriety. An engine of 10,000,000 gallons in 24 hours capacity can be accommodated in a room of 50 by 28 feet interior dimensions, and a hight to the eaves of 16 feet. Extended to 50 feet square, it would accommodate two such engines liberally. An engine of 3,000,000 gallons capacity would need a room of 25 by 35 feet. The same engine in duplicate would require 35 by 40 feet. For intermediate sizes these dimensions may be qualified about in proportion.

The engraving presents the plan of boiler and engine house of one of the Baltimore pumping stations, containing two 5,000,000 engines and six return tubular boilers. The allotment of space is little enough, but by no means inconvenient. It is sometimes considered desirable to provide for the storage of coal within the boiler room. But a contiguous shed for that especial purpose generally saves in construction, and removes the dust and dirt from the immediate neighborhood of the machinery.

The pump well—so marked in the engraving—is a watertight receptacle beneath the floor of the engine room, into which the supply pipe for the pump is carried. Practice proves that it is very desirable to have a well of this kind, so constructed that it can be conveniently emptied, when necessary, for inspection or repairs of the foot valve or supply pipe. In contrast with a long pipe, through which the pump is required to draw water from an adjoining lake or river, it is very much to be preferred. For many reasons, based upon the peculiar action of pumps upon the water column, a long supply pipe should be avoided, especially if any considerable vacuum is to be maintained. The examples frequently occurring prove the truth of this statement. When the water is brought by conduit to a pump well, from which a short supply pipe, provided with a proper foot valve, is led to the pumps, a lift by exhaustion of 21 feet, measuring from the surface of the water to the center of the pump, is not practically objectionable. Yet there is no point more clearly established by the workings of large pumping engines than that the water should be brought to the pumps as nearly on a level with the lower valves as it can be conveniently. Every foot of lift saved is worth something to the engine in a practical point of view. The ability to produce a vacuum is easily impaired by a leak or derangement of the water valves, and this failure always produces concussion and sometimes fracture, by allowing the piston to travel without resistance, for a portion of its stroke, until suddenly arrested by the water, upon which it impinges with a hurtful blow.

Pumping engines are sometimes required to work under a head of supply. This is a somewhat difficult requisition, but with due care it can be successfully met in practice.

As no pump can act efficiently to free itself from the air contained within its chambers at starting, so long as pressure exists upon the delivery valve, a secondary delivery pipe or "by pass" should be provided, to be opened when the gate or check valve upon the main delivery is closed. The pumps can then be moved slowly, under little or no pressure, until thoroughly emptied of air and filled with water. At the same time the steam cylinders will be properly heated, the vacuum established, and everything brought in order for taking up the full work. The "feed well" is a small tank, designed to receive enough of hot water from the steam jackets and air pumps for the supply of the boilers.

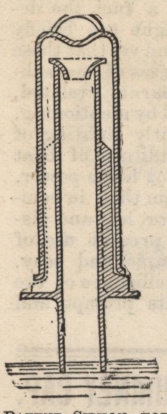
Usually the feed pumps are only attached to the smaller engines, their place being taken by an independent feeding apparatus, arranged to pump hot or cold water, or to charge the pump cylinders, if so required. This last provision obviates the necessity of starting on a dry pump, which sometimes allows the engine to jump badly before catching the water upon which it depends for a suitable resistance. Even with the smallest engine, having a capacity of only 500 or 600 gallons per minute, an independent pump that can be worked by hand is very desirable for feeding the boiler. These cost so little that they are hardly worth taking into account in estimating the cost of water works.

Soil for Plumbers' Use.

Will somebody give me a recipe for making soil!

Answer.—Make a pot of glue of the usual consistency, and then while still hot and the water outside of the glue-pot boiling, stir in sufficient lampblack to make it tolerably stiff. Add also a small quantity of fine or powdered chalk.

A writer, speaking in regard to the dangers arising from bad plumbing, thus alludes to similar dangers in the country, which, however, arise under quite different circumstances: "In every house there is of refuse material a large amount. On washing day many gallons, often barrels, of water in which clothing has been washed, and containing the filth that the skin has thrown off during the week, must be disposed of. All through the week more or less dishwater and dirty water from various sources accumulates. As a rule it is thrown into a drain which is, perhaps, only covered with a board, and carried but a few feet away, when it soaks into the soil or spreads out on the ground and evaporates into the air. If the soil is pervious it may leak into it and some of it eventually find its way into the well. In the course of a short time these slops fill the soil full, a sort of fermentation



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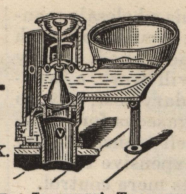

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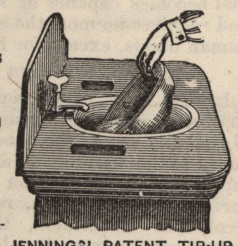
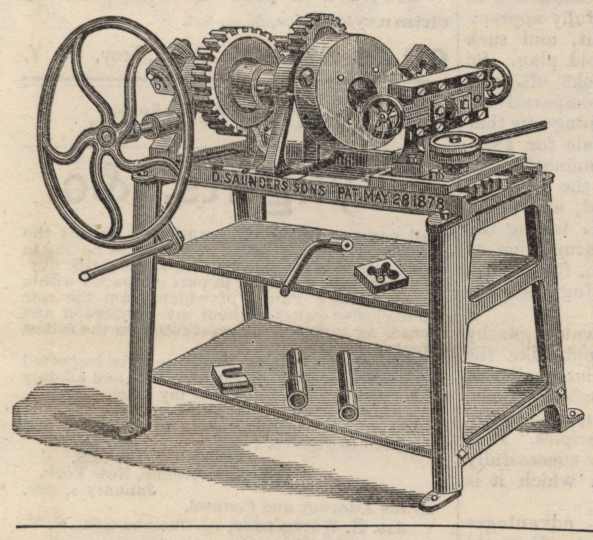


JENNINGS' PATENT TIP-UP WASH-BASIN.



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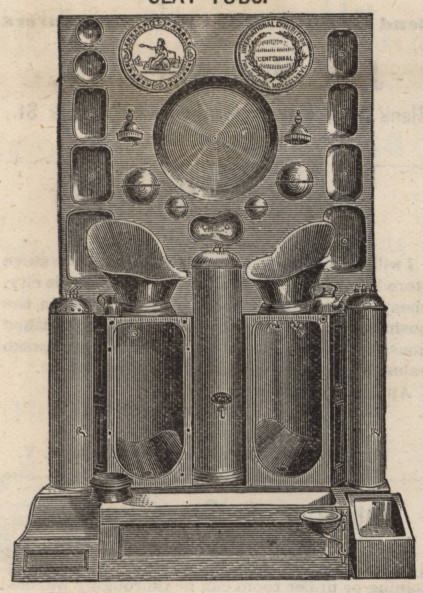

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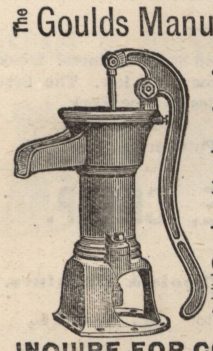

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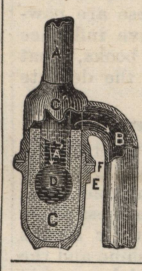

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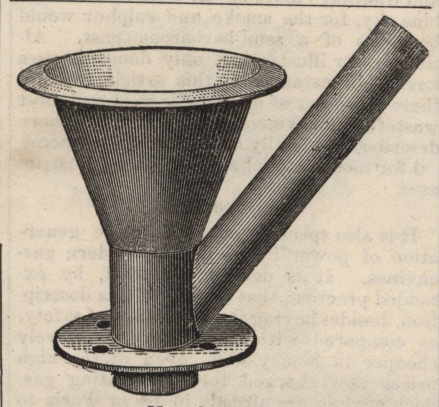

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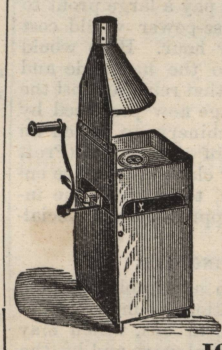

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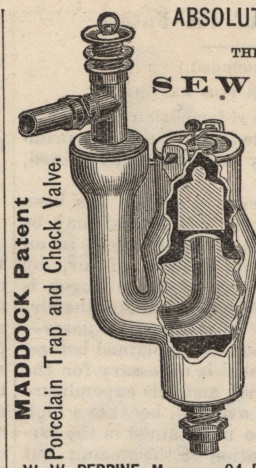

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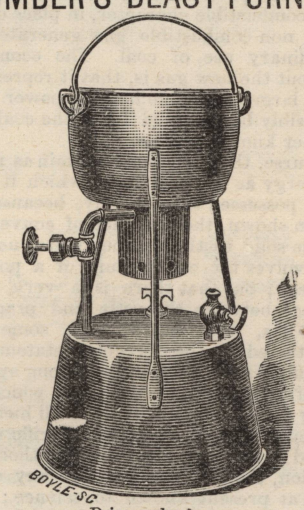

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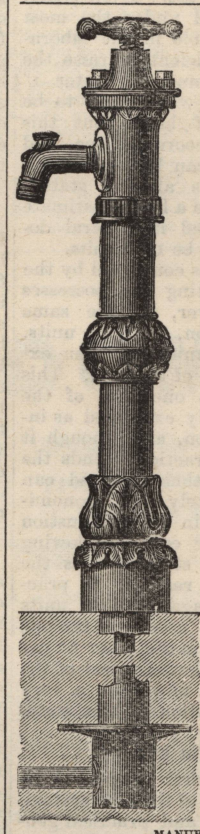

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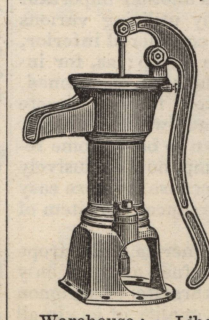

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Illustrated with Wood Cuts and Lar Folded Plates Photo-Engraved from Working Drawings, showing the Methods of piping employed in the best Plumbing Practice of the Time.

The publisher has pleasure in announcing a large and steadily increasing demand for the Second Edition of this standard work, which is the only book that fully and exhaustively discusses the principles and mechanical details of American plumbing practice. Its especial value for the practical plumber will be seen from the following synopsis of its contents:

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This chapter is introductory, giving a brief sketch of the progress which has been made since the Middle Ages in reforming evils prejudicial to the public health, and showing by comparisons drawn from modern architectural practice and mediæval records what progress we have made toward securing health and comfort in house building, and wherein our architecture is still a long way behind our knowledge of Nature's laws.

Chapter II.—Sewer Gas.

A careful inquiry into the nature and action of the gaseous products of organic decomposition in sewers, cesspools, drains and waste pipes. The subject of sewer-gas poisoning is fully considered, and the importance and methods of sewer ventilation discussed.

Chapter III.—Waste and Soil Pipes.

Chapter IV.—Traps and Seals, and the Ventilation of Waste Pipes.

Chapter V.—Water Closets.

Chapter VI.—Service Pipes and Water Service in City Houses.

Chapter VII.—Tanks and Cisterns.

These chapters are strictly practical, dealing with the various house fixtures in general use, and discussing every detail of plumbing work. The examples of good and bad practice are drawn from what the author has seen in the great number of dwellings, hotels and public buildings he has inspected in nearly all parts of the country, and in themselves these five chapters constitute a complete manual of house drainage and water service

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This is probably the most valuable chapter to be found in the whole literature of sanitary science. Its compilation entailed a vast amount of research and a great deal of careful laboratory work in tests, analyses, &c. It is an exhaustive discussion of the action of waters of various composition upon each of the metals employed in plumbing practice, under all the conditions likely to exist. The results of these researches and investigations are stated in the simplest language and made clear to all classes of readers.

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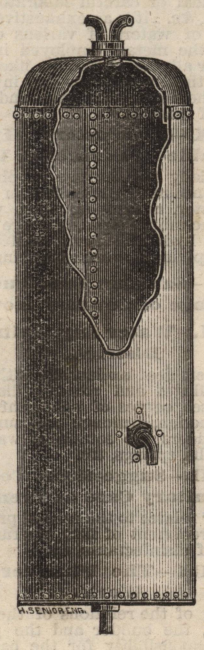
takes place, and as the air is more or less excluded, most poisonous gases are generated. It is now positively known that many diseases have their origin in breathing these gases. It does not follow that they always cause diseases, because the germs may not always be present, but they frequently do. Diphtheria, that scourge of both city and country, has been traced time and again in the city to sewer gas passing into the house. In the country, where less attention is given to the cause of disease, the drain for slops is not always recognized as the source of diphtheria, but in very many cases it has been proved to be so beyond the slightest doubt."

Copper-Lined Boiler for Ranges, &c.

The improvement which we illustrate in the accompanying cuts is intended to give all the advantages of a copper boiler with the strength of iron. It consists of an iron boiler, lined with a sheet of tinned copper in such a way that the water cannot touch the iron at any point. Each sheet of iron is covered with the sheet of copper that turns over the edge, making a double thickness in the seam. This is shown in Fig. 1, where the thin white line represents the copper and the heavy line the iron. A similar arrangement for protecting the edges of the head is shown in Fig. 2, where the copper lining of the head is turned over so that on the inside the iron does not appear. At the lower head the edges of the iron are both outside and do not need pro-

Copper Lined Boiler.—Fig. 1.—Section of Boiler, showing Method of Protecting the Edge of the Iron at Seams.

tection. The lining is put in tightly and conforms to the iron at all points, so that there may be no danger of collapsing the copper separately. The openings are all provided with brass ferrules, which pass into the boiler and through the iron, so as to cover its edges entirely. This leaves the inside of the boiler with a continuous lining of copper. The iron has ample strength to resist a tendency to collaps. A test was made of one of these boilers by the Clayton Steam Pump Works, and a vacuum equal to 26 inches of mercury formed in it without injuring the boiler or starting the lining. The mauufacturers are Messrs. C. A. Keeney & Clarke, 54 Cliff street, New York city. The advantages of this construction will at once



Copper Lined Boiler.—Fig. 2.—Part of Boiler Broken Away, to show Edge of the Head Covered by the Copper Lining.

be seen by plumbers. A boiler as strong as those of iron is obtained, while all the disadvantages of rusting and galvanizing are avoided. The boiler serves in every respect the purpose of an extra heavy copper boiler at a greatly reduced cost. These boilers are strong enough to stand the heaviest pressure, and are tested and warranted before they are sent out. The outside of the boilers is painted to prevent rust. They can be painted or grained in any style desired by the manufacturers, and are in such cases packed in crates for shipment. Ordinarily they can be shipped without boxing.

"Thunder!" was the remark of Ferguson as he formed a crescent over the slippery coalhole cover. "Yes," replied a sober-faced citizen in the doorway, "more than twenty have fallen on that cover this morning, and every one of them expressed the same opinion."

The Fuel of the Future.

(Concluded.)

THE MEANS FOR REFORM.

But how may the reformation of so glaring an evil be effected, and both the primary and secondary loss, already explained, be reduced?

Within a few years a system has been steadily developed, by which coal may be converted to the gaseous condition, in an atmosphere of steam, instead of air, by which the bad influence of the nitrogen is avoided, because the water, unlike the air, is composed entirely of combustible gases—oxygen and hydrogen. As explained before, a large amount of heat is necessary for the gasifaction of the coal, and this expenditure can not be entirely avoided, because a high temperature must be maintained in the furnace for the preparation of the steam; but by a scientific and economical application of the heat, it is largely reduced by the new system. The product is a gaseous mixture of purely combustible character, in place of the largely non-combustible gas generated by the ordinary use of coal. The economic fact about the new gas is, that it represents a much larger available heating power than can possibly be obtained from the coal, by any other known process.

Of course, the gas cannot contain as much heat-energy as the coal from which it was derived possessed theoretically, because, as has been shown, the very act of conversion from the solid to the gaseous state, necessarily involves the expenditure of a portion of its heat; but that there is a very wide difference between theoretic and practical values, has, it is hoped, been somewhat demonstrated by the foregoing statements. It is simply claimed for the Strong system that, after sustaining this loss, which, in varying degrees, is inevitable to all methods of combustion, it has a larger calorific value left, and in a more perfect form for thorough utilization, than is obtainable by any other method at present known to science; and this claim both experiment and practice, on a large scale, most fully substantiate. Take a technical illustration of this: If one pound of the best coal is burned under the most perfect conditions attainable in the laboratory, it develops heat sufficient to raise the temperature of 13,000 pounds of water 1° F. Hence, its calorific power is said to be equal to 13,000 units of heat. But this valuation is the highest theoretical one, and nothing approaching it can be realized in practical operations. As already stated, one-tenth of this would be a liberal estimate for the proportion utilized in general domestic uses. That would be 1300 units.

If the pound of coal is converted by the Strong system, the resulting gas possesses a theoretic heating power, by the same standard of determination, of 9049 units. The difference of 3951 units has been expended in the gasification of the coal. This loss, amounting to about one-third of the whole, is the one already explained as inseparable from conversion, and, though it seems a heavy item, practically ends the waste, because the gas thus obtained can now be burnt so completely and economically that further loss in its combustion need not exceed 10 per cent. Allowing for this loss, we shall still have as the heating power actually realized in practice 8141 heat units, as against 1300 units when the crude coal was used. In the one case but 10 per cent. and in the other 62 per cent. of the maximum calorific power of the fuel is obtained. Let us now take a very simple practical confirmation of this statement.

A DINNER FOR SIX

cooked with 1½ cents' worth of gas. During recent investigations of the new system, committees of scientific and practical gentlemen have visited the works, and on repeated occasions substantial dinners, comprising meat, oysters, vegetables, bread, pastry and coffee, for a party of six, have been cooked by the consumption of 30 cubic feet of gas. To produce that volume of gas required 1 1-5 pounds of coal. Would it be possible to prepare such a meal with such a weight of crude fuel? Would any London cook undertake it with less than 10 times the coal?

The new system makes another important reduction in first cost by utilizing various forms of fuel at present considered inferior, and which are therefore cheap; as, for instance, the dust coal, which, as mentioned, has hitherto accumulated in vast waste heaps at the mines, and which, by Mr. Strong's method, is shown to be, in some respects, superior to the lump, now exclusively sent to market, partly because its more easy conversion still further reduces that item of cost.

Recent operations in America and Europe prove that all grades of fuel are not only available, from pure anthracite to common peat, but yield the same quality of gas in all cases. Guided by the experience of all industrial arts, which shows that systematic manufacture on a large scale, conducted by intelligent workmen, with ample facilities, tends both to the improvement of the product and the reduction of its cost, it is proposed that the fuel shall be converted to gas at suitable central works, instead of, as now, in each man's house, and delivered to the consumer by means of pipes, as is now done with illuminating gas. This wholesale manufacture will not only, in connection with the other items of saving mentioned, greatly reduce the first cost, but will work a wonderful change in the secondary cost, now so excessive; because, in a gaseous form, the fuel becomes capable of self-transportation and requires no more the expensive touch of human hands, except for its mere control.

TEN MILLION TONS OF ASHES.

Instead, now, of the repeated handling of 10,000,000 tons of dirty material in the shape of coal and ashes, the labor is at once reduced to the turning of a valve to regulate supply. The combustion of the gas is so perfect that its flame, resembling that of alcohol in cleanliness, though possessing three times its intensity, leaves no soot or smoke upon the pot to justify the kettle in calling it black, thereby relieving the cook of much untidy work. What the real comfort and convenience of gas combustion in domestic use is, can only be fully appreciated by those who have tried it, and such are unwilling to return to the old plan. So great is it that the skillful cooks of Paris find the use even of the comparatively costly illuminating gas so advantageous that the company there report the sale for 1878, for purposes other than illumination, of 1,800,000,000 cubic feet! All the food for the hospitals is thus prepared, and many other cities the world over are taking the hint and increasing their consumption of gas for such purposes, although, for general fuel uses, the present illuminating gas is too costly.

Not so, however, with the water gas by Mr. Strong's system. It is not, like the other, dependent upon a special quality of coal, but may be derived from any fuels, and generated from these upon strictly scientific and economical principles. It is able everywhere to compete successfully with the crude material from which it is obtained.

There are also collateral advantages scarcely less important than cost. It would remove from our houses the pernicious method of burning coal, with its excessive labor, uncleanliness and risks, not the least of which latter is a sanitary one resulting from the diffusion into our domestic atmosphere of baleful gases representing at once both waste and danger. If these are powerful enough to exert a corrosive influence on silverware, paintings and books, what damage may they not inflict on the delicate tissues of the human body?

LONDON WITHOUT HER FOGS.

Should London adopt the "fuel of the future," as it is already called, it would, besides securing other immeasurable benefits, improve the health and happiness of its inhabitants by admitting into their streets and dwellings more of the sunshine and the blue sky, for the smoke and sulphur would be relics of a semi-barbarous past. Although, for illustration, only domestic uses have been instanced in this article, because these represent at once the largest and most wasteful employment of fuels, the gas here described is equally available and economical for metallurgical and all other industrial arts.

GAS ENGINES.

It is also specially adapted to the generation of power by means of modern gas-engines. It is definitely settled, by extended practice, that motors of this description, besides having the advantage of safety, as compared with steam, are positively cheaper in money cost, even at the high prices now charged for illuminating gas. Such engines are already in use in Paris to the extent of over 5000 horse-power. If, then, a cheap and efficient gas like that produced by the Strong process were distributed to every man's dwelling and workshop, how wonderfully would the minor industries of the race, which, in the aggregate, represent the great bulk of its work, be at once stimulated and simplified! At a selling price of 50 cents per thousand feet (a price at which it would pay a large profit to the producer) one horse-power would cost the artisan 2 cents per hour. Here would seem to be a promise to the mechanic and small manufacturer of that relief against the overwhelming advantage now possessed by capital and costly machinery, to which an eminent philosopher of Germany (Prof. Rouleaux) has recently claimed they are entitled, and must have, to prevent the increase of commercial oppression and socialistic antagonisms.

ILLUMINATING GAS.

The water gas is also admirably adapted to purposes of illumination, by intermixture with light-giving hydrocarbons, which may be accomplished in several ways and by the employment of a great variety of materials, at an important saving, as compared with the old method. The superiority of the light so produced has been amply demonstated in the United States, where the system is in extensive and successful operation in many important towns and cities. Its general adoption is already foreshadowed. Works are now building in that country for the distribution of both the non-luminous and the illuminating gases, so that domestic heat, light and power may be sent out to the citizens. The erection of such works marks an area in this important art of civilization. The purposes of this article being more especially to treat of gas as a fuel, the departments of power and light are briefly mentioned as collaterals; and yet that these are only interchangeable phases of one subject, to which they are inseparably related, may be strikingly illustrated by mentioning, in conclusion, that the nightly lighting of London involves the expenditure of heat energy equivalent to 2,112,292 horse-power.

It is hardly utopian to claim that, in comparison with the gigantic labor, loss and disadvantage generally in the present use of crude fuel, the remedy is simple and easy, and to predict that the intelligence of the age will ere long demand its prompt and universal application.

NORTH AMERICAN CHIMNEY CAP.

All Cast and Wrought Iron.

Sure cure for **poor drafts** and **smoky chimneys.** Price, $6.00, net.

GILES STOVE CO., Troy, N. Y.

Special Notices.

Skylights, &c.

All persons are hereby cautioned against the purchasing, using, vending or selling, or having in their possession for sale or use, any Metallic Skylights, whether wholly or in part embraced within certain Letters Patent of which I am the sole and exclusive owner, without my permission and license, as such will be prosecuted to the fullest extent of the law.

Copies of said Letters Patent may be inspected at my office, or that of my counsel, and all duly authorized Skylights will bear my label.

All so-called patents of other persons are contingent to, and infringements upon, mine, and calculated to deceive.

GEORGE HAYES,
71 Eighth Avenue, New York.
January 1, 1880.

By his Attorney and Counsel,
JAS. H. WHITELEGGE, 136 Chambers St., N. Y.

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For Sale Cheap.

I will sell the stock, tools and fixtures of the stove store lately owned by Mr. N. Downes, in this city, cheap. To a person desirous of engaging in the business this is a rare chance. Oldest established house in the city. Location excellent. APPRAISED value, $3500. Terms, cash or approved paper.

Apply in person or by letter to
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Important to Stove Dealers.

My Patent Air-Heating Attachment for Cooking and other Stoves, Ranges, &c., by which an adjoining or upper room can be thoroughly warmed by one fire, is now for sale in state, county or shop rights. My terms are so reasonable as to leave no room for an infringement of my patent, and at the same time so liberal as to insure large profits to the trade. Circulars sent on application to J. M. PATTERSON, Patentee, Woodbury, N. J.

Wanted.

A customer for a Tin and Stove business. Stock and tools good; price low; rent low. The best milk station within 65 miles of New York.

Address P. O. Box 39,
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FOR SALE, CHEAP.

Set of Tinsmith's Tools & Machines.

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RANGES & COOK STOVES

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Send for Price List and Circulars.

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NEWTON & CO.,

ALBANY, N. Y., Manufacturers of

FIRE BRICK

Stove Linings,

Range and Heater Linings.

Cylinder Brick, &c., &c.

NEW YORK Nickel Plating Co.,

Licensed by United Nickel Co.,

Manufacturers of

STOVE DOOR KNOBS and TURNKEYS.

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Polishing & Plating all kinds of Stove Work.

18 Park Place, New York City.

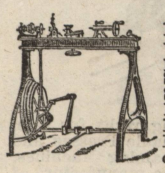
ASH'S IRON ADJUSTABLE

This Truck can be adjusted to any size Range, Cooking or Heating Stove made, and can be lubricated without removing the stove. Being all iron, it is very durable and neat. As its name implies, it is the most perfect Stove Truck ever offered to the trade. Weight of truck, 19 lbs. Price, $2 50, net.

Manufactured by **JAMES ASH,**

No. 108 W. Van Buren st., Chicago, Ill.

ISRAEL H. JOHNSON, JR., & CO.



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Manufacturers of Lathes of all varieties (for foot or steam power), with their supplies, Screw, Lever and Drop Presses, Shears, Jewelers' Tools and Machinery. Also, Mortimers' Patent Rapid Transit Wrench. Designing and Building of Special Machinery, Mill Work, &c.

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YATES' SUPERIOR LIQUID STOVE POLISH.

Patented Jan. 19, 1875.

GUARANTEED THE BEST. IT HAS NO EQUAL.

NO LABOR—NO DUST.

Six years in the market. The demand constantly on the increase. With this polish one man can polish from three to five Stoves (average sizes) in one hour.

One application will protect a stove from rust in the dampest places.

Warranted to be Precisely as Represented.

This Polish must not be confounded with the stove varnishes and stove paints that have been forced on the market during the past few years.

Send for Circular. Manufactured exclusively by **YATES & CO., Rockford, Ill.**

For sale by SIDNEY SHEPARD & CO., 86 Lake St., Chicago, Ill.; SOLAR STOVE WORKS (L. D. Wynn, Agt.), Kansas City, Mo.; JOHN DERUNDEOU, 258 Water street, New York City; WESTERN STOVE MFG. CO., 406 N. Main St., St. Louis, Mo.; SIDNEY SHEPARD & CO., 68 Main St., Buffalo, N. Y.

Pat. Mineral Wool.

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FIRE STONE

A New Lining for Fire Chambers in Trade SOFT COAL Mark. Soft Coal Stoves. A Late Discovery.

CHEAP. DURABLE. CLINKERLESS. TRY IT.

It has proved to be the MOST ECONOMICAL AND ENDURING LINING EVER USED IN SOFT COAL STOVES. It will add to the value of stoves without increased cost.

NEWTON & CO., Sole Manufacturers, Albany, N. Y.

See Testimonials, besides which we have numerous others of the same tenor.

RANSOM STOVE WORKS,
ALBANY, N. Y., Oct. 9, 1879.

Messrs. NEWTON & Co., Albany, N. Y.—*Gents:* We have been testing your new brick for several months in a stove (the "Denmark," late "Derby") burning soft coal, and have submitted the brick to the severest test, by the most intense heat when cast-iron would melt, and after repeated examinations we cannot discover the *least indication of adhesion of clinker.* If you can furnish a brick such as we are testing, it will fill a great want, viz.: durability and cheapness, as compared with iron linings.

Yours respectfully, S. H. RANSOM.

DETROIT, MICH., Jan. 2, 1880.

Messrs. NEWTON & Co., Albany, N. Y.—*Gents:* In reply to yours of 30th, would say that we have used your Fire Stone for some time, and consider them in all respects superior to any thing else we have ever seen or used. Yours truly,

MICHIGAN STOVE CO.
M. B. MILLS, *Purchasing Agent.*

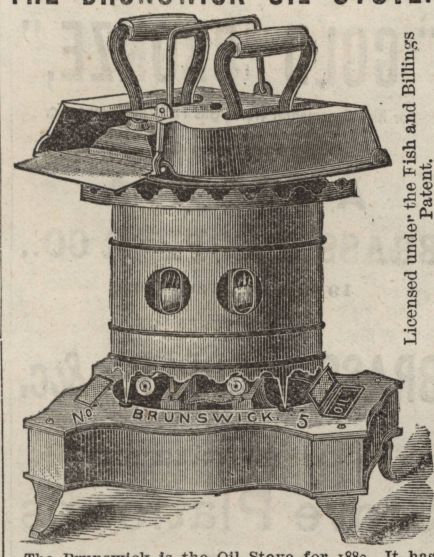
[Extract from the BOSTON COM. BULLETIN, January 10, 1880.]

Newton & Co. of Albany, well known and prominent for many years in the manufacture of fire brick, have after long and persevering experiments succeeded in producing a *clinkerless soft-coal fire stone* lining, which has been put into extensive use the last few months, and is winning golden opinions from the soft-coal burning sections of the country. It is *unlike any* stove lining ever before made, and the secret of its manufacture is solely theirs. Hitherto the difficulties of producing a stove, either for the parlor or the kitchen, to satisfactorily burn soft-coal, has baffled the skill that has been so abundantly exercised by stove manufacturers. The triumph of Newton & Co., in producing this *fire stone* lining has enabled manufacturers, who were alert to seize upon it, to produce a better stove for burning soft coal for this season's trade than has ever before been placed on the market, and the West is taking them with avidity. From annually making a wide circuit in the West, the BULLETIN correspondent has become familiar with the annoyances experienced in the soft coal burning sections, and may be pardoned for expressing with some enthusiasm a high appreciation of what these parties have undoubtedly accomplished.

The public expect something new every year in the stove line, but it is doubtful if ever improvements have appeared that have so soon brought such a shower or *tidal wave* of commendations and congratulations as flow in from the West. And with the new stone lining not an iota of clinker adhered to a stove we saw that had been in use since cold weather came on, fed with the most stubborn of tarry soft coal.

THE *BEST* STOVE SELLS THE *BEST.*

THE BRUNSWICK OIL STOVE.



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The Brunswick is the Oil Stove for 1880. It has more capacity for work, is more convenient, and has more special advantages than all other Stoves combined. It has a new Hot Air Attachment, new style of Tea Kettle, and numerous other special features. Made in all sizes and varieties. Send for catalogue and price list. Manufactured by

F. TULLEY, ROCHESTER, N. Y.

Wholesale Agents: JOHN DERUNDEOU, 258 Water St., cor. Peck Slip, New York; H. H. HULBERT & Co., 117 N. 2d St., Philadelphia; POTTER & Co., Troy, N. Y.; WM. FULLER & Co., Baltimore, Md.

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Stove Brick Linings,

Square, Key and Wedge Fire Brick,

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VITRIFIED DRAIN AND SEWER PIPE

With Connections.

Yard foot of Cross St., BALTIMORE.

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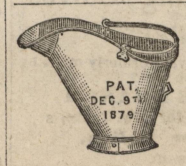

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HENDERSON'S DOME FURNACE.

The Dome is Cast Solid and has no Joints. It is the Best and Cheapest Furnace Made.

THIS FURNACE

IS MADE TO BE

Tight Without Cement

and is easily put up for use, and can be set in any kind of place, being made of

ALL CAST IRON,

and is not liable to get out of repair or leak gas.

THE FIRE POT AND GRATE ARE LARGE,

which insures its working every time with

Little Trouble or Care.

The surfaces being large, makes it a very

POWERFUL HEATER.

The best of references furnished in regard to their merits.

Send for Catalogue and Price List.

Four Sizes are Made,

and can be set either in brick or portable form.

No. 40, No. 50, No. 60, No. 70.

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J. C. HENDERSON,

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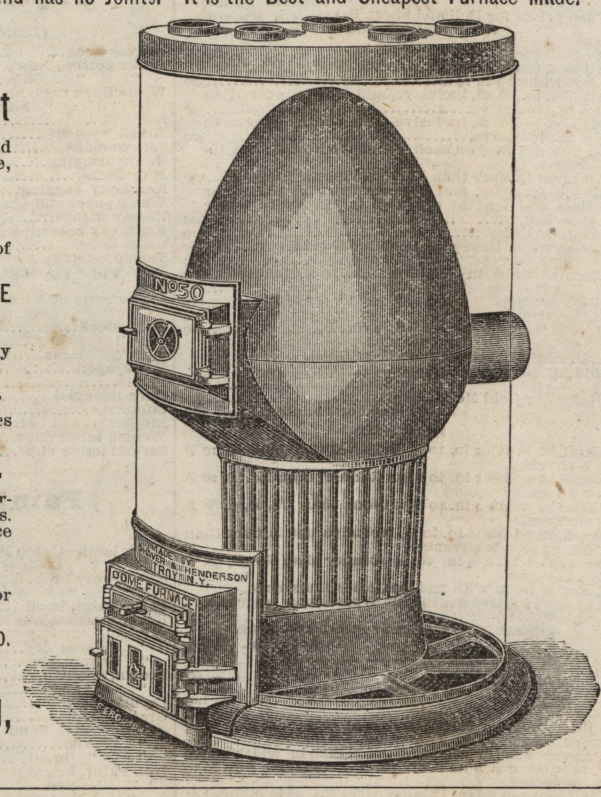

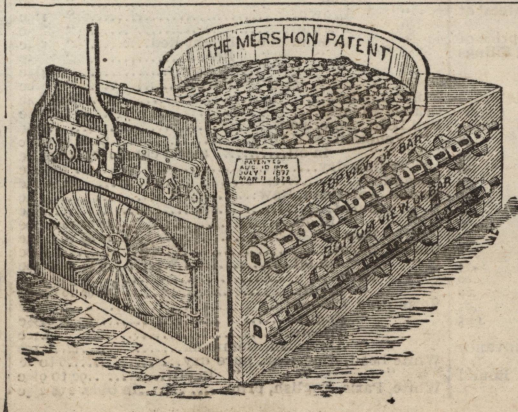

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This is the most complete, easiest working, and the most successful grate and bar ever invented. The attention of manufacturers of boilers and heaters is especially called to it. It has the largest air surface of any grate manufactured, and will generate more heat and steam with the same amount of coal than any other grates. Several sizes supplied, ranging from 18 inches to 30 inches diameter fires. Send for descriptive circular. For license to foundries and others to manufacture address **Pennsylvania Heating and Ventilating Works,** N. W. Cor. Twelfth and Filbert streets, Philadelphia, Pa.

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Common Iron :
¾ to 2 in. round and square.....
1 to 6 in. x ⅜ to 1 in..... ₩ lb @ 3.7c
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Bands—1 to 6 x 3-16 to No 12..... ₩ lb @ 4.7c
Norway Nails Rods..... 7 c

Sheet Iron.

	Common American.	R. G. American.
Nos. 10 to 20	₩ lb 5 @ 5¼c	6½@
21 to 24	" 5½ @ 5¾c	6¾ @
25 to 26	" 6 c	7 @
27	" 6¼c	7¼@
28	" 6½c	7½ @

Galvanized, 10 to 20, B B, ₩ lb 11½c; 2d quality, ₩ lb 10½c
" 21 to 24, " " 12½c " " 11½c
" 25 to 26, " " 13½c " " 12½c
" 27 " " 14½c " " 13½c
" 28 " " 15½c " " 14½c
Patent Planished..... ₩ lb A, 13 B, 12 c
Russia..... ₩ lb, 13½c @ 14½c
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Iron Wire.

Brass and Copper.....List of December 1879. dis 10 %
Bright and Annealed.....Nos. 0 @ 18. dis 25@27½ %
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Galvanized, Nos. 0 to 6..... ₩ lb 10c. dis 15@17½ %
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Fence Staples..... ₩ lb 7¼@7½c
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Japanned Barb Fence..... ₩ lb 14c
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COPPER.—DUTY: Pig, Bar and Ingot, 5c; Old Copper, 4c ₩ lb: Manufactured (including all articles of which Copper is a component of chief value), 45 % ad valorem.

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Braziers' Copper, ordinary sizes, 10 oz., ₩ sq. ft. and over..... ₩ lb 34c
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Braziers' Copper 10 oz. and 12 oz., ₩ sq. ft..... " 38c
Lighter than 10 oz., ₩ sq. ft..... " 40c
Circles less than 84 inch in diameter..... " 37c
" 84 inch diameter and over..... " 40c
Segment and Pattern Sheets..... " 37c
Locomotive Fire-Box Sheets..... " 34c
Sheathing Copper, over 12 oz. ₩ sq. ft..... " 32c
Bolt Copper..... " 34c
Copper Bottoms..... " 37c

No Copper is Sheathing except 14x48 inches, and not to exceed 34 oz. to the sq. ft.

TINNING.

14x48, by the case..... ₩ sheet 6c
14x48, less than case..... " 8c
For tinning both sides, double the above amount.

O'NEILL'S PATENT PLANISHED COPPER. net.

14x48.
16 and 16 oz. and heavier....41c By the case... ₩ lb 40c
12 oz. and lighter.....44c " " ... " 43c

Boiler Sizes.

7 in., 14x52. 8 in., 14x56. 9 in., 14x60.
14 and 16 oz. and heavier....43c By the case... ₩ lb 42c
(And all sizes not over 20 inches wide.)
30x60.
14 and 16 oz. and heavier..... ₩ lb 45c
12 oz..... " 48c

Brass.

Brown & Sharp's Gauge the Standard for Metal; Old English Gauge the Standard for Wire.

BRASS MANUFACTURERS' PRICE LIST.—dis 10% January 15, 1880.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lb, add 3c ₩ lb.

HIGH BRASS.

All Nos. not thinner than to No. 28, wider than 2 in., not wider than 14 in.....32c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in., inclusive.....37c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in., inclusive.....40c
½c ₩ lb advance on each No. above Nos. 28 to 38, inclusive.
All brass thinner than No. 38 is Platers' Brass, at...55c
Sheets 24x48 in., and all sheets cut to particular sizes and lengths under 30 in., in width wider than 2 in.. .....39c
Printers' Rules.....47c
Sheets wider than 30 in. and under 40 in.....49c
" " 40 in. and over.....52c
Circular sheets, in diam. from 4 in. to 14, inclusive...42c
" " over 14 " 20, " ...47c
" " " 20 " 30, " ...51c
" " " 30 " 40, " ...57c
" " " 40 in..... ..61c

LOW BRASS.

Four cents ₩ lb more than High Brass.
Gilding Metal 8c ₩ lb more than High Brass.
Platers' or Gold Metal } In Bars.....50c
Sawed.....53c
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Metal, in width 2 in. to ½ in. to No. 28, inclusive 1c ₩ lb advance.
Metal, in width 2 in. to 1 in. thinner than No. 28, 2c ₩ lb advance.
Metal, in width 1 in. to ½ thinner than No. 28, 3c ₩ lb advance.
Metal, in width ½ in. to ¼, inclusive, not thinner than No. 28, 2c ₩ lb advance.
Metal, in width ½ in. to ¼ thinner than No. 28, 5c. ₩ lb advance.
Metal, ¼ in. in with and less, 10c ₩ lb advance.
Any of the above widths cut to particular lengths, add 7c ₩ lb.

GERMAN SILVER MARKET METAL AND WIRE.

	Market Metal.	Wire.
4 per cent., 12 in. to No. 26	$0.52	$0.70
6 " " "	.56	.76
10 " " "	.64	.88
15 " " "	.74	1.03
18 " " "	.80	1.12

German Silver Sheets over 12 in. wide and weighing more than 16 lb. $2 ₩ lb.
Advance 2c for each additional inch in width above 12 in., and 2c ₩ lb on each No. thinner than Nos. 26 to 36, inclusive.
All German Silver thinner than No. 36 is Platers' at 50c ₩ lb additional.
German Silver Scrap one-half less than net price of 12 in. Market Metal. German Silver Turnings, Filings and Chips half the price of Scrap.

BRASS AND COPPER WIRE.

	High Brass.	Low Brass.	Gild'g and Cop'r.
No. 0 to 20	$0.35	$0.39	$0.45
No. 21	.38	.42	.48
No. 22	.39	.43	.49
No. 23	.41	.44	.50
No. 24	.42	.46	.52
No. 25	.45	.49	.55
No. 26	.47	.51	.57
No. 27	.50	.54	.60
No. 28	.54	.58	.65
No. 29	.57	.61	.68
No. 30	.60	.64	.74
No. 31	.54	.68	.80
No. 32	.68	.72	.86
No. 33	.72	.76	.95
No. 34	.76	.80	1.05

Spring Wire 2c ₩ lb advance.
Flat, Square and Half Round Wire, 5c ₩ lb advance on Round Wire.
Fancy Wire not less than 0c ₩ lb advance Round Wire.

Brass Rods, No. 8 and larger, not less than 2 feet lengths, 40c.
Wire straightened and cut smaller than No. 8, and not less than 2 feet lengths, 45c.
Wire and Rods less than 2 feet lengths, special rates.
Twelve cents ₩ lb extra for spooling on 1 lb spools.

MISCELLANEOUS.

Brass Pail Ears..... $0.52
Brass Door Rail..... .45

SCRAP—Net.

High Brass..... $0.14
Low " ..... .16
Gilding ..... .18
Turnings, Filings and Chips half the price of Scrap.
Terms—Net cash. Interest to be added after thirty days.

TUBING—DIS. 10 % ₩ lb

Plain to No 20, inclusive, above ¼ in. to 3 in $0.45
" above 3 in..... .55
Nos. 21, 22, 23, 2c advance on List for each Number.
Nos. 24, 25, 26, 4c advance on List for each Number.
Above No. 26 special rates.
Plain ¼ in..... .72
" 3-16 in..... 1.12
⅛ in..... 1.62
All Mandrel Drawn Tubes, 5 cents advance on List Prices.
Fancy Tubing to No. 20..... .52
English, Scotch and Extra Patterns Fancy Tubing to No. 20..... .57
Tubing Sawed or Cut 2 to 4 feet long, 2c advance on List.
Add to 2c ½c for each additional cutting under 2 feet.
All Mandrel Drawn Tubes under ¾ in., 25c ₩ lb advance.

ZINC TUBING—NET.

Plain..... .29
Fancy..... .35
Scotch and Extra Patterns..... .38

GERMAN SILVER TUBING—DIS. 10 %.

4 per cent.	.80	15 per cent.	1.35
6 "	.90	16 "	1.40
9 "	1.05	18 "	1.50
12 "	1.20	20 "	1.60

LEAD—DUTY: Pig, $2 ₩ 100 lbs.; old Lead, 1½c ₩ lb: Pipe and Sheet, 2¾c ₩ lb.

American.....6¼@6½c
Bar..... dis 10 %..... 7½c
Pipe..... dis 10 %..... 7¾c
Tin-Lined Pipe..... dis 10 %..... 15c
Sheet..... dis 10 %..... 8½c
Shot.....dis 10 % Drop 9½c Buck, 10½c dis 10 %
Chilled Shot.....10½c dis 10 %

BABBITT METAL.

N. P. U..... ₩ lb 7 @ 8c
A, 20c · B, 16c; C, 12c; D.
ANTIMONY.....20 @ 22c
TIN—DUTY: Plates, Sheets, Tagger and Terne, 1.1c ₩ lb; Electro-galvanized Plates, 2c ₩ lb; Manufactures of, not enumerated, 35 % ad val. Bars, Block and Pigs free. Banca, subject to duty of 10 %.
Banca..... ₩ lb 28c
Straits..... ₩ lb 26c
English..... ₩ lb 25c

TIN PLATES.

I C 10x14, 14x20, 12x12 } Prime Charcoal.....$10.00@ 10.50
" " .....$10.25@ 10.75
I X 10x14, 14x20, 12x12 } Prime Charcoal.....$12.00@ 12.50
" " .....$12.25@ 12.75
D C 12½x17 " .....$9.50 @ 10.00
D X 12½x17 " .....$11.50@ 2.00
For each Aditional X add.....2.00

COKE TIN PLATE.

	Best.	2d. quality.	Wasters.
I C 10x14, I C 14x20	$9.50	8.75 @ 9.00	8.25 @ 8.50
I C 12x12	$9.75	9.00	8.50 @ 8.75

TERNE PLATE.

	Prime Char.	2d. quality.	Coke.
I C 14x26	9.25 @ 9.50	@ 9.00	@ 8.75
I X 14x20	.... @ 11.50		
I C 20x28	19.00 @ 19.50	18.00 @ 18.50	@ 17.50
I X 20x28	... @ 23.50		
I C 20x200	... @ 27.00		
14x20 M. F. Brand			11.00

SOLDER.....No. 1, 14c @ 15c; No. 2, 13½c
SPELTER—DUTY: Pigs, Bars and Plates, $1.50 ₩ 100 lbs.
American, ₩ 100 lbs..... ..6½c@6¾c
Bergen Port from Lehigh Ore..... 10c
Lehigh, on spot..... .9c
ZINC—DUTY: Pig or Block, $1.50 ₩ 100 lbs. Sheet, 2½c ₩ lb.
Sheet, " ..... cask, 8¼ @ 8½c
" ..... open, @ 9 c

Paper Stock, &c.

(Dealers' Selling Price.)

Canvas linen..... @ 5
White cotton, New.....5½ @
" " No. 2.....3½ @
White linen rags. No. 1..... @ 6 c
" No. 2..... 4 @ 4¼c
Seconds..... .3 @
Mixed woolens..... ..2½ @ 3¼c
Soft woolens..... @ 15 c
Gunny bagging.....3⅜ @
Jute Butts.....3 @ 3⅜c
Kentucky bagging.....4½ @
Waste paper and scraps..... @ 1c
Rope cuttings.....1½ @ 3 c
Kentucky bale rope.....4 @ 4½c
Grass Rope.....3½ @ 3¾c
Tarred shaking.....1½ @
Hard white shavings, No. 1.....3½ @ 4½c
Soft " No. 1.....3 @ 3½c
Imperfections, No. 2, best folded sheets. ....3¼ @
No. 1, heavy stock.....3½ @
Book stock..... .2¾@3c
" heavy.....3c
" light..... ..1½@1¾c
Newspapers..... ....2¼ @ 2¾c
Prints.....1½ @
Pure manilas.....2⅝ @ 2¾c
Commons.....70 @
Binders' board cuttings.....85 @
Woolen tailor clips.....18 @ 19c
Satinet tailor clips.....2½ @ 3½c

Paints, Oils, etc.

Paints.

Black lamp—Coach Painters..... ₩ lb 20c
" " Ordinary.....6c
" Ivory Drop, fair.....12 @ 15c
" " best.....23c
Black Paint, in oil..... kegs, 8c; assorted cans, 11c
Blue, Prussian, fair to best.....40 @ 55c
" " in oil..... 45 @ 55c
" Chinese dry.....83c
" Ultramarine..... .....18 @ 30c
Brown, Spanish..... .....1¼c
" Van Dyke.....10 @ 12c
Carmine, 40.....combination price
Green, Chrome.....15 @ 23c
" " in oil.....14 @ 18@ 25c
" Paris..... ..good, 25c; best, 30c
" " in oil..... " 30c; " 45c
Iron Paint, Bright red..... ₩ lb, 2¼c
" Red..... " 2c
" Brown..... " 1½c
" Purple..... " 3c
" Ground in oil, Bright Red..... " 5½c
" " " Red..... " 5c
" " " Brown..... " 4½c
" " " Purple..... " 6c
Mineral Paints..... ...1¼ @ 4c
Orange Mineral..... .....10c
Red Lead, American.....7½c
" Venetian (N. C.) dry.....$1.65 @ $1.70
" " in oil..... asst'd cans, 11c; kegs, 8c
" Indian dry..... ..... 9 @ 12c
Rose Pink..... .....10 @ 13c
Sienna, American, Raw..... .....4c
" Burnt..... .....4½c
" " in oil. .....10 @ 16 @ 20c
" Raw " ....11 @ 15 @ 25c
Umber, Burnt..... .....4 @ 8c
" " in oil.....9 @ 12 @ 16c
" Raw..... ....3½ @ 7½c
" " in oil. .....10 @ 16 @ 18c
Vermillion Chinese..... .....90c
" English..... ... .60 @ 62½c
" Trieste..... .....1.10c
" American, Common..... .....15c
White Lead, American, pure dry... .....6 to 7c
" " " in oil.....9c to 9½c
White, Paris, English, prim ....in bbls. 2 @ 2½c
Yellow Ochre, French.....$1.75
" " " in oil...asst'd cans, 11c; kegs, 8c
" " Vermont.....in casks 1½c
Yellow Chrome.....17 @ 27c
" " in oil.....14 @ 18 @ 25c
Zinc White, American No. 1, dry..... 5 @ 5½c
" " No. 1, in oil 9c
" French (Paris).....8 @ 10c
" " in oil..... @ 10c

Oils.

Linseed, Raw, in casks and bbls.....₩ gal. 85@ 86c
" Boiled, " " ..... 90@91c
Bleached Whale..... 64c
" Elephant.....68c
" Sperm.....1.20c
Signal..... .....65c
Prime Lard..... .....64c
No. 1 " 56c
West Virginia.....16 @ 22c
Drilling..... .....40c
Empire Cylinder..... .....6.c
Miners Oil.....40 @ 50c
Fish Oil, pressed..... .....46c
Neatsfoot..... .....80c
Tallow..... .....65c
Machinery..... .....40c
Engine..... .....50c

Sundries.

Asphaltum..... .....9c
Benzine.....₩ gal. 16c
Chalk..... .....¾c
" Block..... .....¾c
Dryer, Patent, Am'n.....ass't cans 10½c; keg, 9c
Frostings..... .....50c
Glue, White..... .....33 @ 44c
" Sheet..... .....20c
Glaziers' Points, Zinc..... .....8c
Gum, Copal..... .....36c
" Damar..... .....25c
" Shellac, English..... .....48c
" " " dark..... .....42c
Litharge, English..... .....7½c
Mineral Wool, lb..... .....1¼ @ 1½c
Pumice Stone, selected Lumps.....4 @ 6c
" powdered..... .....2¾c
Putty in bladders..... .....3c
" in bulk..... .....2½c
Rotten Stone, soft, English..... .....
Spirits Turpentine..... .....42c
Whiting, Spanish..... .....¾c

CHARCOAL LEADED PLATE, IC 14x20, IX 14x20.
CHARCOAL LEADED PLATE, IC 20x28, IX 20x28.
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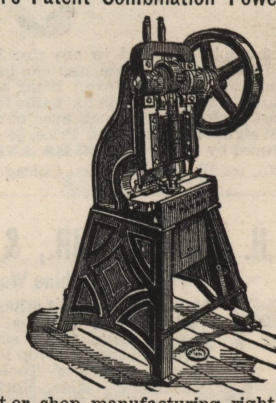

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New Coal Cook Stoves,

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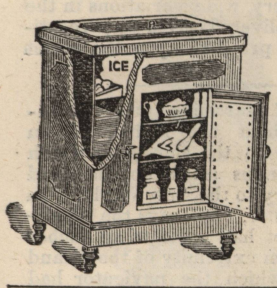

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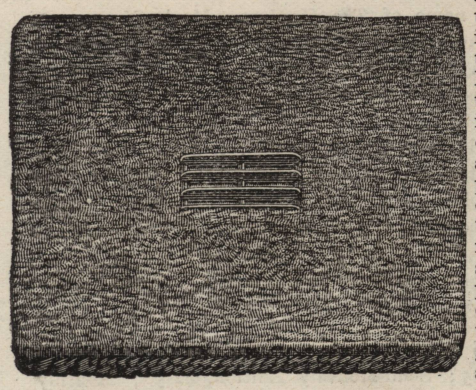
An Improvement in Door Mats.

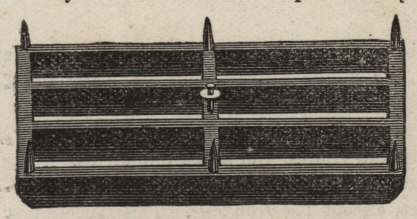
The Lawrence Curry Comb Co., corner Second avenue and Twenty-second street, New York city, are making a new article in the way of a door mat, which they call "The Perfect Mat."

The improvement which they have made consists in forming a recess in the center of the mat and placing in it a scraper. (See Fig. 1.) This is a double advantage, as it



The Perfection Mat.—Fig. 1.—The Perfection with Scraper in Position.

enables a person to clean his feet perfectly, while at the same time the mud falls through the scraper into the recess and keeps the body of the mat in good condition. Fig. 2 shows the under side of the scraper. It is provided with a bolt and nut by which it is held fast, while six sharp points hold it in place and prevent it from turning about upon the mat. The company furnish a great variety of cocoa mats with this patent scraper



The Perfection Mat.—Fig. 2.—Under side of Scraper, showing Bolt and Pins for Fastening to Mat.

attachment. They make only two very moderate claims for the mat. First, that it will always be in condition to do its work, which will be more thoroughly done than in the old style; and, second, that it will wear twice as long, and consequently be cheaper than any other mat.

The Chemical Composition of Pig Iron as Affecting its Value for Foundry Purposes.

So numerous are the circumstances which affect the value of pig iron for foundry purposes, that it would seem almost a hopeless task to endeavor to draw inferences from its chemical composition upon its properties. One grade of pig rarely combines all the elements which will insure the production of castings fit in every respect for the purpose desired, and it is generally necessary to resort to mixtures of various classes, so chosen that the defects of one counterbalance and correct those of the other, while at the same time the practical founder is limited in his choice by the prices and the variety of the material which his local market offers to him. The question how to produce, at the lowest price, the best castings with the metal within easy reach is, therefore, a delicate one; and it is by no means astonishing that founders, relying upon their experience alone, have strong preferences for certain grades of metal, and are willing to obtain mixtures in which they have confidence, even at a sacrifice, because they are frequently ignorant of the reason of the superiority of their pet brands. They are frequently excessively conservative, and find it difficult to adapt themselves to altered circumstances. While in the end actual tests alone can serve to decide upon the merits of an unknown brand, there can be no doubt that a knowledge of the chemical composition of the pig may serve as a guide in more rapidly and cheaply arriving at a final conclusion. In order to correctly appreciate the effect of certain chemical impurities or constituents, it is necessary to possess at least a general idea of their effect. The result, of course, can only be an approximation, because no exact formula can be devised, the presence of one substance in the pig either intensifying or counterbalancing the effect of others. As the precise effect of even a single impurity, if alone, cannot be numerically expressed, it is obviously impossible to predict closely what will be the result of one of the innumerable combinations between four or five chemical impurities. Yet, as we have already stated, every chemical constituent of the pig has a well-defined effect upon all or a few of the properties desirable in the finished product. A work recently published by Prof. Ledebur, of Freiberg, Germany, admirably summarizes the main points in question, and from it we take the following data:

Pig iron always contains carbon, the lowest amount being 2.3 per cent., and if it has little manganese, not over one-half of one per cent., the amount rarely exceeds 4 per cent., while 5 per cent. may be considered a maximum for pig iron low in manganese. The capacity of pig for absorbing carbon increases with the percentage of manganese, and, therefore, 5 per cent. is common when there is 15 to 20 per cent. of manganese, while with ferromanganese, an alloy running as high as 85 per cent. of manganese, it rises to 6.5 or even 7 per cent. of cabon. It is an important fact that as the carbon increases the point of fusion of the iron goes lower. Liquid cast iron has all the carbon in solution, but when the metal chills, a portion of it is separated as graphitic carbon, which causes the fracture of the metal to look gray, and is the characteristic constituent of gray pig. The size and the amount of graphitic carbon in cast iron depends primarily upon the rate of cooling of the metal, the maximum being reached when it is done very slowly. This gives the founder an opportunity to control the quantity of graphitic carbon in the castings, and the fact mentioned above explains why the graphite is greater in those portions of castings which are large and cool slowly than other thinner parts which chill rapidly. It is not necessary, however, to remelt cast iron and allow it to chill under conditions different from those under which they first cooled in order to change the amount of graphitic carbon. Continued heating at a bright-red temperature, and gradual cooling by packing in some poor conductor of heat, will suffice to turn castings which have become white by too rapid chilling, into gray cast iron. This tempering process, which has nothing in common with the process of making malleable iron, is resorted to occasionally in works which are forced to use metal tending to produce white castings. The effect of the presence of graphitic carbon is to loosen the grain of the iron and reduce its density and tenacity on the one hand, while on the other it renders the work of cutting the metal with turning and shaping tools much easier, and at the same time reduces its brittleness. This constitutes its main advantage over white pig, and while graphitic carbon is characteristic of gray pig, combined carbon, the second form, preponderates in white pig, although it should be noted that it is always present also in gray pig. The tenacity and elasticity of iron seems to increase to a certain limit in direct proportion to the combined carbon it contains, but beyond that limit the tenacity and, notably, the elasticity decline very rapidly. The determination of the exact point when the maximum of both desirable qualities is reached is an uncertain matter, because a decrease of the combined carbon entails an increase of the graphite, which, as we have already stated, injuriously affects the tenacity.

The presence of manganese affects both the hardness and the fusibility of pig iron, both being increased as the amount grows. Manganese has a greater affinity for the metalloids than iron, and it is for that reason that manganiferous pig is capable of absorbing a greater amount of carbon. Closely related to this peculiarity is the fact that it has a tendency to retain carbon in a combined soluble state, so that the presence of manganese obstructs the separation of graphitic carbon and thus tends to prevent the formation of gray pig iron. While thus manganese is objectionable in some respects, it is valuable in others. It has a great affinity also for sulphur and phosphorus, and if the pig be left quietly in a liquid state, its compounds or alloys with those bodies rise to the surface of the metal, purifying it to a certain extent. It is very effectual also in preventing oxidation of the iron, a circumstance which is sometimes taken advantage of in remelting pig. Pig iron almost always contains silicon, the amount varying generally between 0.1 and 4 per cent., but exceptionally rising to 10 per cent. It has the effect of interfering with the capacity of the pig iron to absorb carbon, but is absolutely essential for the production of gray pig. Iron free from silicon remains white even if it is slowly cooled, and gray pig may be converted into white metal by withdrawing from it its silicon. As we have already noted, manganese has a certain effect, and, therefore, pig may remain white, even if it contained a sufficient amount of silicon to cause a strong separation of graphite, if its action be counterbalanced by the presence of manganese. Again, pig holding several per cent. of manganese may turn out gray if a sufficient amount of silicon is present simultaneously. Only 0.4 per cent. of silicon, or even less if phosphorus and sulphur are absent, will make pig iron gray, provided the amount of manganese it contains is low. Those brands are generally highest as regards the amount of graphite found, which contain 2 to 3 per cent. of silicon and about 4 per cent. of total carbon. As soon as the percentage of manganese goes beyond one per cent., the total carbon, it is true, will increase; but, on the other hand, much more silicon will be necessary in order to induce a separation of graphitic carbon. This relation of manganese and silicon to carbon explains why melted white pig will change to gray if it be given an opportunity to absorb silicon, or to lose more manganese than is necessary to counteract the silicon present. Silicon affects the physical properties of pig in a manner quite similar to carbon, although the action is much weaker, so that one part of carbon may be considered equivalent to about two to five parts of silicon. It should be noted, however, that the presence of graphitic carbon caused by the silicon may modify or even counterbalance its effect. This explains why siliceous gray pig is not so hard as, and much more easily worked than, it would be if the silicon were not present, and that, for the same reason, it is less brittle than white pig free from silicon. At the temperature of melting iron, silicon possesses a strong affinity for oxygen, so that the greater portion may be removed by an oxidizing action, and the pig be thus converted into white metal. Under certain circumstances, notably by the presence of manganese and materials rich in silicon, additional amounts of silicon may be introduced into the iron.

Phosphorus is a frequent impurity in pig iron, the amount varying from a trace to as much as 3 per cent. Its effect is to sensibly reduce the hardness, and notably to affect the elasticity and toughness of the castings. Phosphoric pig is not capable of resisting shocks or concussions without breaking, and this disadvantageous effect is increased as the amount of combined carbon grows. For most purposes a percentage lower than 0.5 per cent. is not likely to make castings liable to sudden fracture, but it is more plainly noticeable at 1 per cent., and becomes dangerous at 1.5 per cent. The brittleness of phosphoric castings is affected by the amount of combined carbon, and as the latter increases as the percentage of silicon decreases, an average amount of the latter will act favorably upon the use of such metal for castings. Pig holding more than 1.5 per cent. of phosphorus should under no consideration be used, unless it is mixed with better grades. The fluidity of molten pig is greater when phosphorus is present, and such metal sharply fills the molds and chills with a smooth surface, and it is for this reason that a moderate percentage, not over 1 per cent., is considered quite acceptable. It must be kept lower, either when it is desired to produce castings which are expected to be able to resist shock well, or when the articles produced are thin. In the latter case rapid cooling increases the percentage of combined carbon, which, as we have noted, exaggerates the action of phosphorus. It is, therefore, extremely erroneous to believe, as many text books teach, that phosphoric pig is the best material for art castings. Phosphorus impairs the formation of graphitic carbon, and therefore acts in this respect like manganese, although not in so pronounced a manner. If two brands of pig possess the same percentage of carbon, then the one being highest in phosphorus must also contain the greater amount of silicon, if the castings produced from both are to be equal as regards the amount of graphitic carbon.

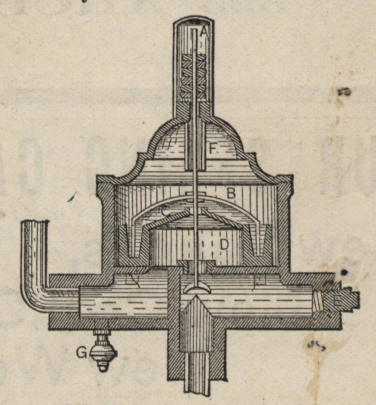
The quantity of sulphur carried into pig iron during the process of smelting ores in the blast furnace, naturally depends primarily upon the amount which the ores themselves contain, but it is greatly influenced, also, by the nature of the blast furnace cinder, the amount being greater if the cinder is high in silica. The presence of sulphur has the effect of impairing the tendency of the carbon to separate in the graphitic form, and of decreasing the dissolving capacity of the iron. As regards the latter its action is opposed to that of manganese, while concerning the former it would counterbalance the desirable effect of any silicon present. It is much stronger in this respect, pig containing 1 per cent. of phosphorus remaining white even if considerable quantities of silicon are in the metal. A small percentage of sulphur is advantageous rather than otherwise, as regards the strength and the elasticity of the castings, provided the inerease in the amount of combined carbon caused by its presence does not impair this result. It is for this reason that for castings which are to be made very strong, pig is used with much success that runs as high as 0.1 per cent. But, as a rule, sulphur is not desirable beyond 0.06 per cent., because in even as small a quantity as 0.1 per cent. it is injurious in other respects. It is a serious inconvenience which sulphur produces, that the pig will remain thick even at high temperatures, und that it does not well fill the molds.

Such is the effect of the various chemical impurities upon the quality of pig iron for castings. It will be noted how largely various bodies differ, and how the simultaneous presence of one or more in appreciable quantities is apt to counterbalance the good effect or correct the defects occasioned by others. We may state, in conclusion, that arsenic, if present in quantities of about 0.1 per cent., will produce metal of great hardness and fluidity, filling the molds well. It has been used for making projectiles and armor plates.

The Rockaway Improvement Company, which is constructing the extensive hotel and other buildings at Rockaway Beach, Long Island, N. Y., to be opened to the public during the coming season, has just signed a contract with the Holly Manufacturing Company, of Lockport, N. Y., for a set of Quadruplex Pumping Engines, of 1,500,000 gallons capacity, together with the boilers, to be ready for use at the opening of the coming season.

New English Gas Regulator.

During the past year the English exhibitings of gas apparatus have been very numerous. The gas companies have been taking much pains to encourage the use of gas and to provide the best appliances for its management. Naturally, a great many novelties have been exhibited. Among the numerous regulators, or "self-acting gas governors," as they are called on the other side of the water, we find the one which is shown in the accompanying sketch. It consists of the usual casting, or external shell, with inlet and outlet pipes, as usual. The valve is controlled by a floating cup, or chamber, B, upon the under side of which the gas acts. D is an annular trough of glass, which contains the mercury. C is an inverted glass cup, which floats in the mercury and regulates the pressure. A is the chamber which protects the weights upon the spindle. By increasing or diminishing the number of these, the regulator may be adjusted for any desired pressure. Mercury regulators, as they are called, or those which depend upon the action of a float upon mercury, have always labored under very serious disadvantages, on account of the fact that mercury attacks all the common metals which could be used for making the regulator, except iron. The iron, in turn, was quite likely to be melted out by the action of the gas and the moisture which it contained. This has been a great annoyance to inventors who have at-



New English Gas Regulator, with Glass Float.

tempted to introduce gas regulators of this type.

In this city, several years ago, a gentleman built a number of gas regulators with copper floats. When these failed he renewed them with brass and bronze, and it was only after these had been eaten out by the mercury that he learned that iron was the only metal suitable for his purpose. The substitution of glass for iron in the cup and float does away with all difficulty from this cause, the glass not being attacked by the mercury, which does not come in contact with any metal.

The valve and its seating are of brass, and present no features of novelty. The governor is said to give very good results, and even under very wide variations in the quantity of gas delivered, gives no perceptible change in the pressure upon the outlet side.

The *Moniteur* of Martinique prints an interesting story about the finding of an anchor belonging to the ship upon which Christopher Columbus sailed on his third voyage of discovery to the New World. On the night of August 1, 1498, says the *Moniteur*, the small fleet had come to an anchor at the southwestern extremity of the Island of Trinidad, to which the navigator had given the name of Arenas Point. Washington Irving relates that Columbus, who was a very poor sleeper, suddenly heard a frightful noise, apparently coming from the South. Rushing on deck he saw rolling toward him a wave as huge as a mountain, which threatened to submerge the fleet. All hands thought their last hour had come; but the only damage sustained was the loss of one of the anchors of the Admiral's ship. The big wave was caused by the sudden swelling of one of the rivers that empty their waters into the Gulf of Paria, the existence of which was unknown to the discoverer. The incident is mentioned in the narrative of the voyage bequeathed to us by Ferdinando, Columbus' son. This historical anchor has been found after all these centuries by Señor Agostino, the owner of Arenas Point. It weighs 1100 pounds, and is of decidedly primitive form. Señor Agostino found it while making some excavations in his garden. This garden, upon careful measurement, appears to occupy the precise spot where rode the ships of the great mariner in 1498. The finder at first took his treasure trove for a Phœnician anchor, but upon attentive examination he found the date of 1497 on the stock.

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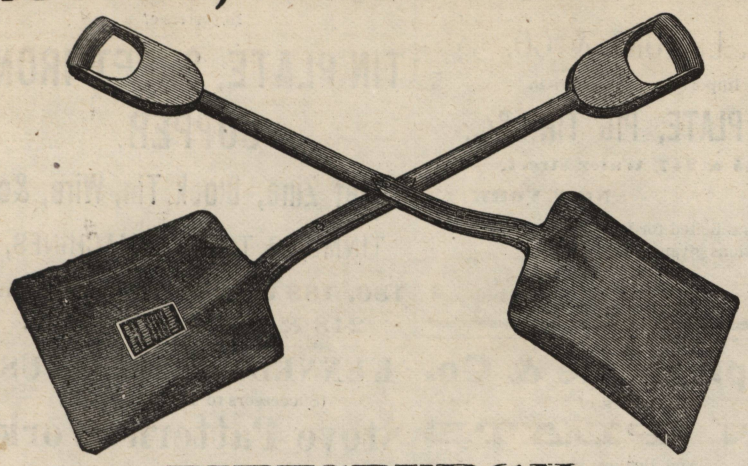

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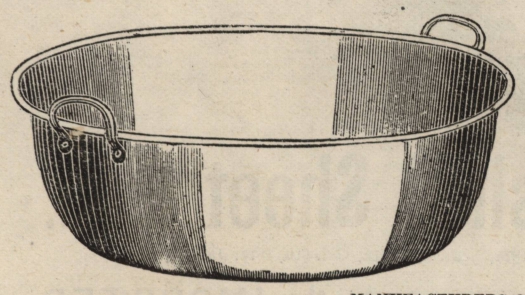

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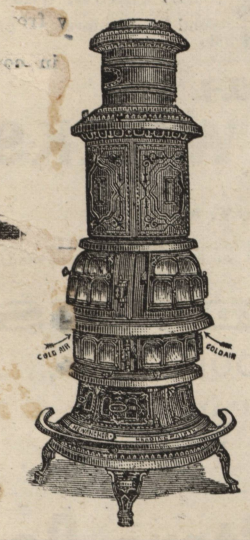

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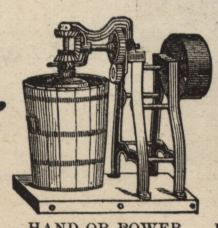

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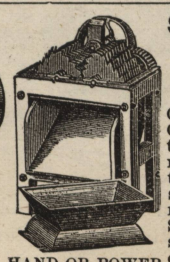

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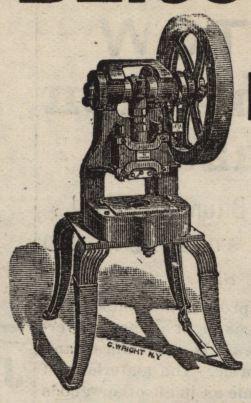

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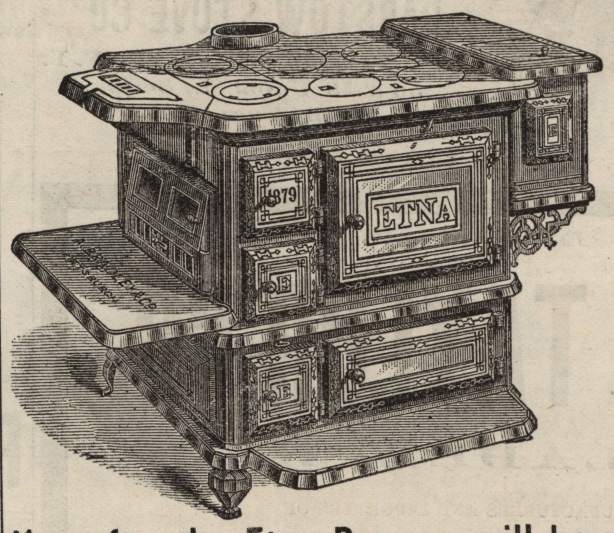

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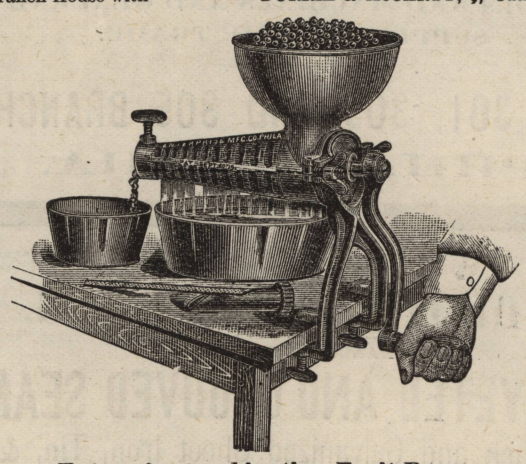

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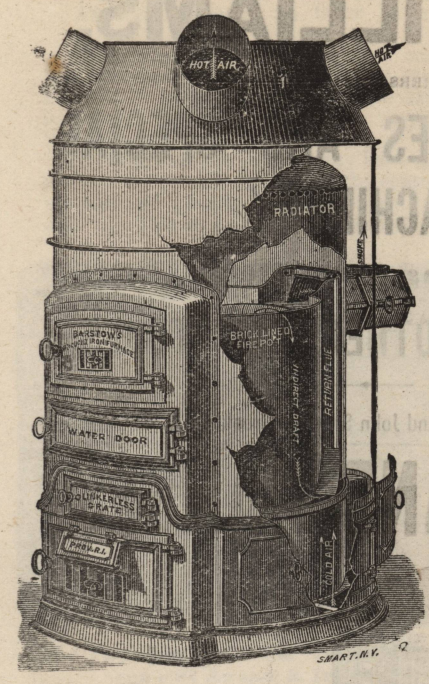

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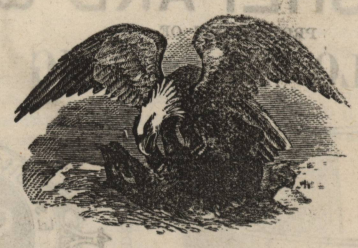

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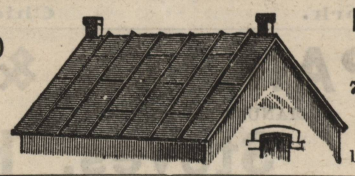

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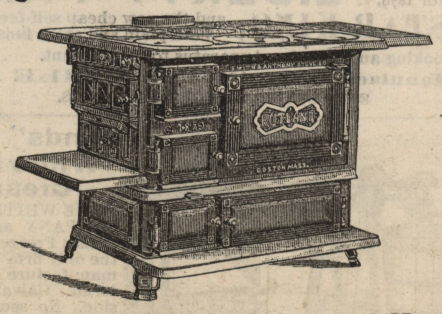

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